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Applying Deming's philosophy and principles to the instructional process in higher education

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Applying Deming's philosophy and principles to the instructional process in higher education

by

Jane Anne Andrews

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CHAPTER I

INTRODUCTION TO THE STUDY

A new management philosophy for business and industry, based on customer satisfaction, empowerment of employees, and use of data in decision-making has emerged over the last decade. Credit for the origin of this philosophy, known by a variety of names like Total Quality Management (Sherr & Lozier, 1991), Continuous Quality Improvement (Fischer, 1992), and Strategic Process Improvement (Spanbauer, 1992), is given primarily to William Edwards Deming (Walton, 1986). Although Deming originally applied his philosophy and principles to Japanese businesses after World War II, Americans did not begin to adopt them until the 1970's and 1980's. In recent years, educational institutions have begun to follow business and industry's lead.

Authors of articles in current literature, who embrace the Deming philosophy, write that educational paradigms are changing. They suggest that educators are giving more emphasis to satisfying customers identified as students, parents, employers, other educators and educational institutions, boards of trustees, accrediting agencies, and the general public (Seymour, 1992).

Rationale for the Study

Where adopted by colleges and universities, Deming's principles have been applied primarily to non-instructional functions of the institutions like physical plant maintenance, payroll, registration procedures, or mail distribution (Seymour & Collett, 1991). Despite

the fact that teaching and learning are the nucleus of an educational institution, Deming's principles and practices have not yet emerged to any great extent in the instructional areas (Seymour and Collett, 1991). Little research exists linking the philosophy and principles of Deming with postsecondary classroom instruction.

Assumptions

The purpose of this study is to identify, describe, examine, and understand the attitudes, teaching strategies, teaching techniques, and assessment methods of selected postsecondary educators who apply the philosophy and principles of William Edwards Deming to their classroom instructional process. The study examines why and how the educators have tried to improve the learning process for their students by adopting Deming's theory. In doing this, a conceptual model of a "Deming" educator is developed.

In this study, four assumptions are made. First, the classroom is regarded as an organization where the instructor or professor acts as the leader of the teaching and learning process.

The second assumption is that the numbers of instructors and professors who have adopted the Deming philosophy, and consequently put it into practical use in their classrooms, are relatively low.

The third assumption is that instructors and professors want to learn more about the Deming philosophy and principles. Furthermore, educators want to learn how Deming's philosophy and principles can be applied to college and university classroom instruction.

The fourth assumption is that students are the primary customers of instructors and professors. When, as in this study, the idea that learning is the product of education is adopted, then students become the people most directly affected by the instructional process as their pathway to learning. Although groups of customers such as professors of courses that follow, potential or current employers, and receiving institutions are important, students are viewed as instructors' and professors' major customers in this study. The study focuses on the teaching and learning process that takes place between the classroom educators and their student customers.

Limitations

Literature and research addressing the application of Deming's philosophy to the postsecondary instructional process are limited. Although articles about the topic are beginning to appear in periodicals, few books have been written about this topic. The review of selected literature for the study reflects this fact.

Respondents selected for the study were not intended to be representative of college and university professors. They were purposefully selected because of their reported attempts to apply Deming's philosophy in their instructional processes.

The scope of the study is also limited geographically to major respondents residing within the upper midwestern United States. At the time the research was gathered, all were teaching in public higher educational institutions, although the institutions that employed

them are different: a large research university, a smaller university which focuses primarily on teaching, and a technical college.

Significance

The study adds to the current knowledge about application of quality principles to the instructional process. The study integrates current literature about quality with actual application of Deming's quality philosophy and principles to a classroom environment. In doing so, the study provides a base of research for future investigations.

Questions

The study explores and answers the following predetermined questions:

1. What attitudes about teaching and learning did the selected respondents hold?
2. How did the selected respondents perceive quality in the classroom?
3. How did the selected respondents apply Deming's principles and philosophy to the instructional process?
4. What strategies and techniques, reflective of Deming's philosophy, were being used by the selected respondents?
5. How did the study's respondents assess the effectiveness of their strategies and techniques?
6. What were the similarities and differences in the quality approaches being employed by the study's respondents?

7. How did students perceive the quality methods of the educators selected as respondents for this study?

8. Are Deming's philosophy and principles appropriate for instruction in postsecondary educational institutions?

Methods

A five-step procedure was used in this study. First the literature about quality and Deming's influence on its development was reviewed. The effect of Deming's ideas on higher education were explored.

In the second step of the procedure, information about the applicability of Deming's ideas to postsecondary classroom instruction was gathered from educators knowledgeable about Deming's philosophy and principles and also knowledgeable about the instructional process. Initially a focus group of educators generated and categorized characteristics of professors or instructors who use Deming's philosophy and principles in their instructional process. These characteristics were critiqued by another group of educators, primarily people who had written about quality in the classroom. During the research process, the characteristics suggested by the two groups of professionals were used to help in the identification of Deming's philosophy and principles in the classroom instructional processes under study.

The characteristics established in this procedure, those referenced in quality literature, and those revealed during the research process were used later to develop a conceptual model of a Deming educator.

Next the respondents were selected. Although respondents had identified themselves as people who were implementing Deming's philosophy and principles in their classroom instruction, they were also recommended as respondents by their professional associates. Those colleagues included other faculty members and college or university administrators who knew about the individuals' work.

Data were gathered during the fourth step of the research procedure. A series of interviews and observations were held with the respondents and several of their students. Members of one respondent's program advisory committee were also interviewed. Documents revealed during the interview and observation process were obtained when possible. Documents included such items as course syllabi, quality measurement tools, instructor evaluations, books, and a video tape.

In the fifth step all data were analyzed. A conceptual model of an educator who exemplifies Deming's philosophy and applies Deming's principles to the instructional process was developed. Themes from the data collected in the research process were linked with Deming's theory of profound knowledge and his Fourteen Points for Quality Improvement. Each theme was compared to Deming's work to determine if it fit into Deming's philosophy and principles.

Definition of Terms

The following terms are defined as they are used in this study:

Philosophy means profound knowledge (Deming, 1993), a system for optimizing an organization. Deming (1993) writes that profound knowledge is a "theory for transformation" (p. 50) which will change the management of government, education, and industry. In this study the university or college classroom, led by a professor or instructor, is regarded as an organization that creates a positive learning environment for students through the educator's understanding of profound knowledge.

Deming's principles include his Fourteen Points for Quality Improvement (Deming, 1986).

Quality refers to the management philosophy and principles expressed by Deming (1993). Included are his theory of profound knowledge, Fourteen Points for Quality Improvement, and his emphasis on meeting and exceeding customer expectations. Creating quality is regarded in this study as an endless continuous improvement process.

The instructor is the technical college educator selected for this study.

Professors are the university classroom educators selected for this study.

The term educators is used in this study to reference all of the major respondents, the instructor and professors.

Attitude is a manner of thinking that revealed an educator's beliefs about the instructional process.

Attributes are characteristics or traits given to the major respondents by other individuals.

Strategies are educators' overall schemes for accomplishing their classroom objectives.

Techniques are specific methods or procedures, used by the study respondents, that support strategies.

Assessments are techniques designed to measure student competency or progress.

The instructional process provides a framework in which teaching and learning occur. Included in the instructional process are strategies, techniques, and assessments. In this study the instructional process is also called the teaching and learning process.

Organization of the Study

The first chapter, Introduction to the Study, provides an introduction to the entire research study. The research problem is identified and discussed. Research questions are stated. A brief explanation of the research methods employed, definitions of key terms, as well as assumptions, limitations, and significance of the study, are outlined.

The second chapter, Review of Selected Literature, examines the literature about quality issues. It highlights the contributions of Wm. Edwards Deming and then looks at the application of quality issues for educational institutions. It concludes by summarizing Deming's views about the American educational system.

In the third chapter, Research Methods, the research methodology used for the study is described. Sources of data, methods of data collection, and methods of data analysis are explained. The chapter concludes with evidence of the study's trustworthiness. As is common with many qualitative studies, the third and fourth chapters have been written in first person.

The research itself comprises the fourth chapter, Research Findings. Data are interpreted and grouped in similar categories. Characteristics of the respondents are derived and compared to Deming's philosophy and principles.

The last chapter, Conclusions, includes a summary of the research in the form of a conceptual profile of a Deming educator. The chapter ends by suggesting further research study topics.

CHAPTER II

REVIEW OF SELECTED LITERATURE

To assist in understanding the application of Deming's philosophy and principles to postsecondary classroom instruction, literature about quality, the quality movement, and Deming's contributions to quality is reviewed in this chapter.

The first section of the chapter begins with a definition of quality synthesized from numerous sources. It continues with a brief look at the status of the quality movement in higher education organizations.

The second section of the chapter examines the influence of William Edwards Deming. A historical look at the development of the quality movement, Deming's philosophy of profound knowledge, and his Fourteen Points for Quality Improvement are explored.

The third section of the chapter summarizes the application of Deming's philosophy and principles to postsecondary classroom instruction. It includes descriptions of operational tools commonly used by quality practitioners for managing change, as well as specific applications of Deming's philosophy and principles to the instructional process.

The chapter concludes with Deming's ideas about the American educational system. His statements about that system provide support for this study.

Quality

This section of the literature review begins with a discussion of quality. Quality is defined first. Then quality issues in higher education are discussed.

A Definition

Quality is a term that has emerged in America's business world over the last decade. Quality programs have been adopted by many business organizations and carry a number of names, among them: Total Quality Management (Sherr & Lozier, 1991), Continuous Quality Improvement (Fisher, 1992), Strategic Quality Management (Seymour, 1992), Continuous Process Improvement (Spanbauer, 1992), and Total Quality (Ciampa, 1991).

The quality philosophy is based on the ideas of continuous improvement, customer satisfaction, and the use of data in decision-making. As the words imply, continuous improvement means a never-ending process of planning, action, evaluation, and change.

The people who actually define quality, the customers, are people affected by the organization's product (Seymour, 1992). The most obvious customers of an organization are external, the individuals or groups who use the organization's product. Less visible are the internal customers, primarily employees within the organization.

Internally quality organizations must be focused on empowering their workers. The essence of this belief is that the person doing the job is the individual most knowledgeable about that position, and as a result, the person most able to make decisions and changes to

improve job productivity. For most organizations this emphasis on employee empowerment requires an attitude change by management and workers (Spanbauer, 1992).

The third characteristic of quality is the use of data for making decisions. Data come from gathering accurate information about processes and procedures over time. "Views not backed by data are more likely to include personal opinions, exaggeration and mistaken impressions. Data volume has nothing to do with the accuracy of judgement. Data without context or incorrect data are not only invalid but sometimes harmful as well. It is necessary to know the nature of that data and that proper data be picked as well" (Komatsu Ltd., quoted in Walton, 1986, p. 96). Deming stresses the importance of using data to minimize confusion. He also emphasizes management's responsibility in making improvements based on reliable data, a basic premise of the continuous improvement philosophy.

Quality and Higher Education

Although quality programs are being adopted throughout the United States by hundreds of businesses and industries, colleges and universities have not embraced quality principles extensively. In 1991, estimates were "that the number of individuals devoted to the topic runs well up in the hundreds, the number of institutions trying TQM (Total Quality Management) in particular offices might be near one hundred, the number of those that have committed to TQM on an institution-wide basis stands at two dozen, of which the number with deeper experience constitutes a mere handful." (Marchese, 1991, p. 8).

There are several major reasons why higher education institutions should adopt the quality philosophy, principles, and practices. According to Seymour, "Survival is the first order of business for any organization" (1992, p. 3). Colleges and universities are in a competitive environment and, students, like business customers, will simply take their business elsewhere if they are not satisfied.

Besides competition, cost is a prime consideration for students enrolling in higher education. Quoting Aims McGuinness of the Education Commission of the States, Seymour continues, "When there are pressures for tuition increases, students are going to come down with a vengeance about [the quality of] what they are getting [for their money]" (Seymour, 1992, p. 5).

Quality is also being judged through accountability efforts in higher education (Seymour, 1992). Legislatures, accrediting agencies, federal and state departments of education, and professional licensure groups are all calling for proof that students exiting from colleges and universities are competent in their areas of study.

Competition, cost, and accountability are all factors that have encouraged higher education's interest in quality. As a result, several colleges and universities have appeared as innovators in the continuous quality movement. They include Colorado State University, Delaware County Community College (PA), Fox Valley Technical College (WI), Lamar Community College (CO), University of Chicago (IL), University of Minnesota, University of Wisconsin, and University of Wyoming (Seymour & Collett, 1991).

Seymour and Collett (1991) write that community colleges and small private colleges have the "most comprehensive TQM efforts," (p. 3) among higher education institutions. Community colleges, in particular, tend to have been involved with quality programming over a longer time period than have universities. Seymour and Collett speculate that community colleges have had more time to develop and improve their efforts, thus, are more comprehensive with their quality ventures. They also surmise that small private colleges, because they are less encumbered by bureaucracy, are able to change more quickly than their larger counterparts.

Within the community college system a Continuous Quality Improvement Network (CQIN) was formed in 1992. Composed of presidents of 16 community colleges, the group "is dedicated to fostering learning and application of the concepts, techniques and tools of continuous quality improvement" (Hendley, 1992, p.16). It is obvious that interest is widespread, as the CQIN group includes presidents from Arizona, California, Colorado, Iowa, Maryland, Michigan, Pennsylvania, Texas, and Wisconsin.

Fox Valley Technical College (WI) has had a comprehensive Total Quality Management system in place since 1985. "As it drove TQM concepts deeper and deeper into the institution, it began to reap high, measurable returns in morale, cost reduction, student attainment, and community approbation. As a result, it has become a Mecca of sorts for TQM initiates, the Alverno of the movement, with eighty colleges visiting last year and a new Quality Institute offering publications, training materials, consultation, and workshops..." (Marchese, 1991, p. 9).

Many people, including Sherr & Lozier (1991), Seymour (1992), and Chaffee (1991), point to Fox Valley's success and submit that the quality philosophy and principles can be successfully adopted by colleges and universities. Because "if it isn't our idea, it can't be good" (Seymour, 1992, p. 24), is the standard response to change in most postsecondary institutions, a new paradigm is needed for higher education.

That new paradigm, states Seymour (1992), is based on organizational leadership that "must, by word and deed, convey the message that customer satisfaction, through a process of continually improving quality, is the responsibility of every member of the organization" (p. 15).

On most campuses, a culture change will be required if quality efforts are to be successful (Winter, 1991). That change can be promoted by adopting continuous improvement's "five key ingredients: [a] honesty, solving a problem requires admitting that it exists; [b] shared vision, participation of everyone involved; [c] patience, study and...a great deal of time; [d] commitment, from all levels; and [e] TQM theory" (Sherr & Lozier, 1991, p. 5-6).

Changing the culture begins with top management. Commitment from the top of an organization is an essential element. For this reason, quality training usually starts with college or university administrators, then proceeds on to encompass all employees of the organization (Seymour & Collett, 1991).

Fox Valley used a top-down sequence in their first phase of training. They began by using an external consultant. Top executives and board members were trained first, followed

rapidly by other administrators and union leaders. After that a quality coordinator and faculty teams provided training for other employees, i.e., contracted faculty, adjunct faculty, and support staff. Training for new employees is done on a continual basis. Phase II training is more intensive and specific to the individual's position (Spanbauer, 1992).

At the core of the quality philosophy--and of culture change--is the focus on satisfying the needs of the customer (Seymour, 1992). Sherr (1992) describes higher education customers as "internal and external beneficiaries" of quality. Within the college groups with a variety of functions--the faculty, admissions office, maintenance--are all linked together as internal customers (Corts, 1992). External customers of colleges and universities include legislatures, accrediting agencies, alumni, taxpayers and other financial contributors, governing boards, as well as current and prospective students.

Deming's Influence on Quality

Credit for the origin of the quality concepts is given to an American, William Edwards Deming (Walton, 1986). The history of the quality movement, Deming's Profound Knowledge, and his Fourteen Points for Quality Improvement are summarized in this section.

History of the Quality Movement

Deming, born in 1900, was educated as a mathematician, physicist, and statistician. While working with Walter Shewhart at the U. S. Department of Agriculture during the late

1920's, Deming learned about statistical control. He was particularly intrigued with one of Shewhart's principles, random variation, which demonstrated that process parameters could be charted between defined limits. High and low limits were set, points beyond those limits identified, and causes for error studied. Workers were trained to do the charting, allowing them to make adjustments in their work as needed, and thereby giving them greater control over their jobs (Walton, 1986).

During World War II Deming worked with Stanford University, where he assisted in the development and teaching of statistical quality control methods. These techniques were aimed at enhancing America's wartime production (Walton, 1986).

After the war ended, the United States, as the victor with a booming economy, no longer seemed to be concerned with quality issues. By that time Deming had established a private practice as a statistical consultant and had become a professor at New York University's Graduate School of Business Administration. His ideas were basically ignored by the post-war American business and industry community (Walton, 1986).

In 1947 the Supreme Command for the Allied Powers hired Deming to assist in preparations for the 1951 Japanese census. As a result, he spent considerable time in Japan and, unlike the majority of Americans occupying Japan after the war, he spent much time with the Japanese people. Largely because of the friendships he had made, the Union of Japanese Scientists and Engineers (JUSE) invited Deming to speak about quality control methods. Ichiro Ishikawa, JUSE President, arranged for Deming to speak with CEO's of

21 of Japan's largest industries. They, too, became interested and by 1951 Deming had reached the majority of Japanese companies (Walton, 1986).

In the 1950's Deming began to work with the Japanese to reform their management philosophy and industrial productivity. Japanese managers learned to work with their employees closely and cooperatively, while employees collaborated within work teams known as Quality Circles (Ishikawa, 1985). The customer, i.e. the consumer, was at the center of the improvement efforts, and the Japanese were "ignited" (Deming, 1992) by that concept.

By the late 1970's, American businesses had begun to look at Japanese successes and had become interested in making improvements within their own companies. Under the leadership of Chief Executive Officer William Conway, the Nashua Corporation, a manufacturer of carbonless paper, became one of the first companies to discover Deming's quality management philosophy. CEO Conway had heard about Deming from Japanese business associates and hired him to help the company look at more than just their manufacturing processes. Nashua turned towards its workers for help in developing a positive work environment where employees, divisions, and even suppliers were, and still are, involved in a process of continuous improvement (Gabor, 1990).

Despite the success with Nashua, there was still no recognition of Deming's work in the U.S. until an NBC documentary, "If Japan Can...Why Can't We?", produced by Clare Crawford-Mason, aired in 1980. Only then did American businesses begin calling Deming for his assistance (Walton, 1986).

Deming was actively involved in spreading his philosophy until his death in 1993. As part of the 1992 World Class Quality Leadership Program at The George Washington University, Deming spoke eloquently about transforming the workplace. He talked about transformation of education, government, and industry and said, "We need transformation and a new system of reward....We need to release the power of human resource and the power of intrinsic motivation that people are born with....We need cooperation between people, countries, government, industries; and in transformation everyone will win" (Deming, 1992).

Although other Americans, most notably J. M. Juran and Philip Crosby, were influential, Deming receives the majority of the credit for developing the basic philosophical principles of quality. Deming calls his philosophy a system of profound knowledge (Deming, 1993, p. 94).

Deming's Philosophy: Profound Knowledge

Deming describes profound knowledge as a system composed of four inseparable parts: appreciation for a system, knowledge about variation, theory of knowledge, and psychology (Deming, 1993). "Profound knowledge...is a theory for transformation" (Deming, 1993, p. 50) designed to change the management of industry, government, and education.

Appreciation for a system develops with a goal that is clearly defined, that is understood by everyone within the organization, and that allows everyone--customers,

stockholders, suppliers, and employees--to experience long-term gain. In creating something of value, the system's aim is directly related to betterment of the life of everyone within the system (Deming, 1993).

A system's management is responsible for "optimization" (Deming, 1993, p. 53) of the organization. Optimization, described as a process for bringing all system components together in an interdependent relationship, is a necessary part of achieving the organization's aim. Management's task is to create a cooperative organizational environment where all system components operate together for systemic gain (Deming, 1993).

Statistical variation, the "inevitable difference among individual outputs of a process" (Brassard, 1989, p. 85) is the basis of Deming's philosophy of continuous improvement. "Statistical theory is helpful for understanding differences between people and the systems that they work in," Deming states (1989, p. 9). He maintains that an understanding of variation, a natural, normal phenomenon of all processes, is integral to implementation of the quality principles. Deming identifies two causes of variation--special and common (Walton, 1986).

Common cause variation is inherent in every process. It is always present and touches everything and everyone involved in the system. Because common causes are normally imbedded as routine procedures within the system, they can only be altered by management (Walton, 1986).

Special causes of variation are the more easily identifiable. Special causes are defined as "nonrandom patterns...not always part of the process...that do not affect

everything and everyone. They are intermittent, unpredictable, and unstable" (Spanbauer, 1992, p. 87). Special cause variation can be eliminated more easily than common cause variation, most likely by the employees closest to the cause. Management need not be involved with ejecting special cause variation. Removing special cause variation makes the system stable. According to Deming the stable system is under statistical control (Walton, 1986).

Deming stresses that knowledge emerges from theory. Knowledge, he states, is used to predict the future based on the observed past. "Rational prediction requires theory and builds knowledge through systematic revision and extension of theory based on comparison of prediction with observation" (Deming, 1993, p. 105). Without theory, he asserts, there is no revision, no meaningful experience, and no learning.

When he writes about psychology, Deming states that people are innately inclined to learn and are intrinsically motivated to do so. However, such external factors as rankings or ratings demoralize people and undermine the joy they find in their work, Deming maintains.

Deming (1993) thinks that systems based on rewards are difficult to justify. Monetary reward systems, in particular, can become meaningless and discouraging. Instead, Deming recommends systems that incorporate intrinsic rewards. The rewards, stemming from development of self-esteem, confidence, and efficacy, bring joy (Deming, 1993). Appreciation for a system, knowledge about variation, theory of knowledge, and psychology are the cornerstones outlined by Deming (1993) as profound knowledge. Profound

knowledge is based on 14 guiding statements for creating quality, The Fourteen Points for Quality Improvement (Deming, 1986).

Deming's Principles: The Fourteen Points

Deming's principles, The Fourteen Points for Quality Improvement, are his "bedrock philosophy of management" (Walton, 1986, p. 33). Short explanations of each point and applications to educational organizations are summarized in this section.

Point 1: Create constancy of purpose for improvement of product and service.

"Create constancy of purpose for improvement of product and service" (Deming, 1986, p. 24). Deming wrote of the two major categories of problems facing companies--today's and tomorrow's. Acknowledging that today's problems have an immediacy to them, he urges companies not to make the mistake of emphasizing only short-term concerns. He states that constancy of purpose rests with long-term commitment, which necessarily incorporates long-term planning. He suggests that companies must be innovative, invest their resources in research and education, and constantly strive to improve their product design and service.

In educational settings a variety of views have been applied to Deming's first point. Masters and Leiker (1992) assert that an educational organization should have a futuristic leader who places institutional emphasis on student satisfaction. Bonstingl (1992) stresses the importance of creating a learning process for each student leading to that

satisfaction. Cornesky (1993) sees constancy of purpose as meaning clear definition of course objectives designed to meet "present and projected needs of customers of higher education" (p. 21).

Point 2: Adopt the new philosophy.

"Adopt the new philosophy" (Deming, 1986, p. 26) is the second of Deming's points. He urges United States companies to adopt the philosophy that has worked so successfully in Japan. Deming claims that U.S. businesses must strive to eliminate mistakes, defects, antiquated training, poor supervision, management without commitment, and workers not suited to their jobs and too afraid to ask questions about how to do those jobs.

Commitment from the top with employee training and resource allocation is also essential in adoption of Deming's philosophy to educational institutions (Masters & Leiker, 1992). Bonstingl (1992) suggests that top leaders support continuous improvement efforts by promoting extensive use of teacher-student teams. Cornesky (1993) points towards the importance of trust and commitment to quality in the acceptance of course goals and objectives by both faculty and students.

Point 3: Cease dependence on mass inspection.

Deming says, "Cease dependence on mass inspection" (Deming, 1986, p. 28). Quality can only be assured if inspections take place constantly and at critical times during

the production process, not at the end. Multiple inspectors, he maintains, validate the mistakes made by previous inspectors, so should be eliminated.

Educational institutions have long relied on testing as the major means of inspection. Bonstingl (1992) suggests that student self-assessment, rather than testing by educators at the conclusion of a learning activity, be implemented. Deming himself spoke directly to the issue of testing in a 1993 video conference. When asked by a participant how student learning could be assessed without giving a test, Deming simply replied, "Ask them [students]" (Creating Learning Organizations, 1993). Deming left the question of how to "ask them" without testing unanswered.

Point 4: End the practice of awarding business on the basis of price tag alone.

"End the practice of awarding business on the basis of price tag alone" (Deming, 1986, p. 31). The least expensive is not the best, Deming declares in his fourth point. Quality is not guaranteed by price. Therefore, long-term relationships between suppliers and purchasers need to be established. Purchasing agents and departments need to be re-educated to judge for quality before price.

Masters & Leiker (1992) approach this quality point by stating that pay should not be used as a discriminator in selection of quality personnel. Bonstingl (1992) takes a different tack, interpreting this as a suggestion that relationships between the educational institution and the community should be viewed as supplier-customer associations.

Point 5: Improve constantly and forever the system of production and service.

"Improve constantly and forever the system of production and service" (Deming, 1986, p. 49), asserts Deming. Quality must begin with managers, as they are the people who have the power to establish the desired result. Management must be willing to share their knowledge with workers and give them the authority to continually improve the production process.

As managers, classroom educators should be "empowered to make continuous progress in the quality of their learning and other aspects of personal development", Bonstingl (1992, p. 79) maintains. Masters and Leiker (1992) approach this point by suggesting that the educational system improve to create new services and processes that also benefit students.

Point 6: Institute training.

Deming's sixth point is, "Institute training" (Deming, 1986, p. 52). Companies must establish a climate of understanding and appreciation for variation between their employees. He talks about differences in the way people learn, e.g., through writing or reading, and stressed that everyone must be impacted by training within the organization.

Masters and Leiker (1992) suggest that educational institutions promote staff development for all employees. Staff development should include training programs for new employees that specifically address the institution's culture and expectations. Furthermore, continuous training for educators should assist them in teaching students how to set goals,

become more effective, and engage in self-assessment (Bonstingl, 1992). Cornesky (1993) writes that students, as well as faculty, must be trained in the quality principles to get the most benefit from their endeavors.

Point 7: Adopt and institute leadership.

"Adopt and institute leadership" (Deming, 1986, p. 54) because management's job is leadership, not supervision. Deming makes several suggestions for instituting leadership: remove barriers to pride of workmanship; work to improve the system, not the people; and demand that supervisors understand the work they supervise and have the power to make corrections in it.

Chief Executive Officers must be willing to promote and provide for change within an educational institution (Masters & Leiker, 1992). In addition, educational leaders must assume the roles of coaches or mentors in accomplishing this change. "Leading", says Bonstingl (1992), "is helping, not threatening or punishing."

Point 8: Drive out fear.

"Drive out fear" (Deming, 1986, p. 59) announces Deming. Fears are created because company expectations for quality are not realistic. These expectations should be eliminated. Expanding on the meaning of fear in the workplace, Deming states that resistance to knowledge is often created by fear.

Bonstingl (1992) states that fear is a counterproductive and destructive force on a school's culture. "Shared power, shared responsibilities, and shared rewards" (p. 80) are needed instead of fear. Masters and Leiker (1992) narrow the view of fear and suggest that annual tenure reviews for all but those faculty operating outside of the control limits be reduced.

Point 9: Break down barriers between staff areas.

Teamwork is essential to support Deming's ninth point, "Break down barriers between staff areas" (Deming, 1986, p. 62). He stresses the need for inter-departmental understanding, suggesting that this can be accomplished by regarding other departments as customers.

Break down departmental competition and barriers in educational institutions, urge Masters and Leiker (1992). Cornesky (1993) is even more specific when he suggests that instructors break these barriers by working together "to identify problems and implement changes that will build and maintain quality" (p. 23).

Point 10: Eliminate slogans, exhortations, and targets for the work force.

"Eliminate slogans, exhortations, and targets for the work force" (Deming, 1986, p. 65). Deming says that slogans, exhortations, and targets place blame on the workers. The real responsibility should be placed on the system that creates blame. Management is

responsible for improving the system, and informative posters, rather than exhortations, would demonstrate responsible management.

"Fix the system instead of fixing blame on individuals," suggests Bonstingl (1992, p. 81). One way of fixing the system, submit Masters and Leiker (1992), is to provide employees of educational institutions with tools and the means for process improvement.

Point 11: Eliminate numerical quotas.

Deming divides his eleventh point, "Eliminate numerical quotas" (Deming, 1986, p. 70), into two categories, one for the work force and one for managers. He suggests that work force quotas be replaced by studies that culminate with suggestions for improvement leading to customer satisfaction. For managers he discourages the use of artificial improvement targets and recommends that the focus on outcomes should be adjusted to include process.

Both Cornesky (1993) and Bonstingl (1992) reinforce this point by suggesting that a focus on letter grades may have long-term negative effects on students. Student performance, they say, cannot always be represented by grades.

Instead, students' work should be focused on quality and achieved through continuous process improvement. Loehr (1993) endorses a learning environment of cooperation, rather than competition, as an integral component of continuous process improvement. Cornesky (1993) agrees that competition between students, fueled by traditional grading practices like

the use of standardized tests and quotas created by the normal curve, stifle Deming's philosophy of continuous improvement.

Point 12: Remove barriers that rob people of pride of workmanship.

"Remove barriers that rob people of pride of workmanship" (Deming, 1986, p. 77). This point is applied to both salaried and hourly wage employees. Deming suggests that the working environment must lend itself to establishing pride. He recommends that equipment be reliable, that numerical quotas be eliminated, and that everyone have a thorough understanding of the expected outcomes and how his or her job relates to those outcomes.

Teamwork is a strategy that can be employed under this point. Bonstingl (1992) asserts that systemic causes for student and faculty failures can be eliminated through collaborative teamwork. Masters and Leiker (1992) take a different view of this point and suggest that performance appraisals be eliminated and replaced with recognition of continuous improvement efforts.

Point 13: Encourage education and self-improvement for everyone.

"Encourage education and self-improvement for everyone" (Deming, 1986, p. 86). Deming stresses that education should be constant and not exist just to meet immediate needs. He writes that organizations need "people that are improving with education" (Deming, 1986, p. 86). Bolla (1992) recommends that educational institutions commit

resources for faculty development, "sabbaticals, leaves-of-absence, release time, and ...travel" (p. 199-200), as well as for formal training in quality principles.

Point 14: Take action to accomplish the transformation.

Deming's last point, "Take action to accomplish the transformation" (Deming, 1986, p. 86), explains that management will have difficulty with the transformation he proposes. But "They will struggle over...the 13 points....They will agree on their meaning and on the direction to take. They will agree to carry out the new philosophy" (p. 86).

For implementation of Point 14 Deming suggests a process improvement model he adopted from Walter Shewhart (1986). The Plan-Do-Check-Act (PDCA) cycle is designed to help management achieve this final point (Walton, 1986).

The first step [Plan] is to study the process in question and then decide what can be done to improve that process. In Step 2 [Do] improvements are made. Step 3 [Check] focuses on observation of results. In the final step [Act] analysis of the results takes place. Then the entire cycle begins again with the knowledge accumulated during the process forming the basis of the first step [Plan] (Walton, 1986). The PDCA cycle can be adapted to educational institutions and to the teaching and learning process (Bonstingl, 1992).

Applying Deming's Quality to the Classroom

A new way of thinking about students and teachers emerges with the quality philosophy. Following the Deming model adopted by business and industry, students become "customers" (Hau, 1991, p. 1) of the learning process.

Objections to the use of the word "customers" to describe students are not unusual in higher education. Such opposition is the reason why some authors, who write about quality issues for higher education, use other terms like "clients" (Bradley, 1993, p. 69), "beneficiaries" (Chaffee & Sherr, 1993, p. 80), or "actual rather than passive learners" (Bradley, 1993, p. 204).

No matter what label is used for identification, students become responsible for their own learning and that of their fellow students, while a professor or instructor becomes a "learning enhancer" (Romero-Simpson, 1992, p. 82), "supplier" (Hudson, 1992, p. 121), a "manager" (Loehr, 1993, p. 15) of learning, or a "coach and cheerleader" (Cornesky, 1993, p. 44).

Deming provides some guidelines for faculty who want to apply his philosophy and principles to the instructional process when he described the attributes of a leader. A leader, he says, is a "coach and counsel, not a judge" (1989, p. 26). A leader is a person who recognizes differences in people and encourages his [or her] people to learn constantly. Deming, an "unceasing learner" (1989, p. 26) himself, asserts that a leader works cooperatively with the pieces of the system that precede and follow him. A leader "creates trust, listens and learns without passing judgment on him that he listens to, does not expect

perfection, and understands the benefits of cooperation and the losses from competition between people and between groups" (1989, p. 27). A leader "understands a stable system" (1989, p. 26) and can identify and assist any person who is outside that system. Leaders do not rank people as they work to improve the system. Seymour (1992) summarizes Deming's descriptions of a leader by writing that "a leader is someone who helps others do their jobs better" (p. 157).

Accepting the view of teachers as leaders and students as customers, as defined previously, in the learning process may be one of the hardest tasks facing college and university faculty who want to apply Deming's thinking in their classrooms (Seymour, 1992). If classroom educators "take seriously the notion that everyone wants to develop his or her potential, then we simply have to look at our own philosophy and how it drives what is done within the classroom" (Cornesky, 1993, p. 45).

A few postsecondary educators, who regard faculty as leaders within the classroom, have begun to write about Deming's philosophy and principles as they apply to the instructional process. When the teacher is viewed as a leader as proposed by Baker, Roueche, and Gillett-Karam (1990) then teaching becomes leadership. Loehr (1993) asserts that a teacher who leads helps learners to "do a better job" (p. 8) of learning. He also recommends that students develop learning relationships with their teachers and mentors as part of a self-directed learning strategy.

Leadership strategies for classroom educators incorporate Deming's philosophy and principles. Strategies include such concepts as empowering students and creating a continuous improvement instructional process.

Empowering Students

Empowerment of students, who become responsible for their own learning, should be the goal of the classroom instructor, Cornesky (1993) maintains. To begin to empower students, fears about the instructional process must be reduced or eliminated.

Not everyone, including the student, believes that fear and inspection should be eliminated entirely in the instructional process. Teal (1992) discovered that students she surveyed listed avoiding failure as the primary reason for studying. Although "this trend must be reversed if teaching and learning are to be enhanced" (p. 149), Teal concludes that it may not be desirable to totally eliminate the fear of failure in the classroom. However, Teal states clearly that "professors would be wise in not going overboard with fear tactics" (p. 155).

To facilitate students' empowerment, the classroom educator, a "Super-Leader" (Cornesky, 1993, p. 42), must change the classroom environment and assume a new role in preparing learners for the next century. In reaching all students the Super-Leader or "quality instructor" (p. 42) must establish a classroom climate that encourages people to become inquisitive learners who develop a continuous desire for learning. This cannot be done utilizing a "one-directional [teaching] style" (p. 43), but requires the classroom educator to

become a "guide, resource person, coach and cheerleader, or helper" (p. 44). Students need to learn from professors how to evaluate their own work. Student self-evaluation will increase self-esteem, as well as academic achievement.

Creating Continuous Improvement

Establishing a means for insuring continuous improvement in the instructional process is part of applying Deming's philosophy. Progress alone is not adequate (Roberts, 1992).

A classroom educator who creates "constancy of purpose" (Deming, 1986, p. 24) begins to do so by defining student learning as the product or service in education. After that definition is established the improvement of teaching techniques and course content becomes the instructor's responsibility (Loehr, 1993).

Cornesky (1993) provides a "quality index" (p. 187) that professors and instructors can use to assess and then improve upon their own classroom instructional process. His self-assessment index is modeled after the Malcolm Baldrige Award criteria.

The Malcolm Baldrige Award is part of the Malcolm Baldrige National Quality Improvement Act of 1987. This legislation was designed to improve quality and productivity by stimulating American companies towards improvement, recognizing achievements of successful companies, establishing guidelines for quality improvement efforts, and providing guidance for other organizations who wanted to engage in improvement efforts (1993 Award Criteria). The Award is presented annually to American companies who have excelled in quality management and achievement.

Cornesky's (1993) index is divided into the Baldrige Award's seven categories. Each category includes several subcategories. The major categories adopted from the Baldrige Award are: Leadership, Information and Analysis, Strategic Quality Planning, Human Resource Development and Management, Management of Process Quality, Quality and Operational Results, and Customer Focus and Satisfaction. In Cornesky's index educators rank themselves by assigning from one to five points to each subcategory then totaling all the subcategory scores and calculating a "'quality index' (QI) of [their] classroom processes and systems" (Cornesky, 1993, p. 187).

One way to promote continuous improvement in the instructional process is to adopt Deming's Plan-Do-Check-Act (PDCA) model. At the University of Wisconsin Hau (1991) adopted PDCA as "the SIAM cycle:...Study current situation, Identify vital problems, Act on problems, and Monitor progress" (p. 1). Both models study problems initially, make improvements, and observe and analyze results before the cycle begins again.

In a pilot project with a business statistics class Hau (1991) formed a team of students to help him improve the quality of his teaching. After surveying the class members, the team identified problem areas. Hau made adjustments according to the data generated by the students, and they surveyed again. One change he made involved giving the students program commands for their computer assignments rather than making them determine which commands were appropriate. The percentage of students finding computer instruction insufficient dropped dramatically from 78% to 22% after this simple change was made.

In developing instructional guidelines for Advanced Organizational Behavior, a course for management majors at the University of Miami, Romero-Simpson (1992) reports that he also adopted Deming's PDCA cycle. First he reviewed quality literature and then adopted principles for the course consistent with that literature. In his guidelines he included a strong customer orientation, communication rather than inspection, a process focus, and statistical thinking to measure and reduce variation. His objective was to create a "learning environment" (p. 81) by helping students improve their abilities to learn in a system characterized by constant, continuous student feedback regarding the course content and procedures.

Next Romero-Simpson (1992) established a "learning routine" (p. 82) for each student to follow. A student had to read the topic materials before class, become part of a instructor-assembled team, experience each topic through a simulated activity or case study, participate in team discussion, become a team representative or take part in total class discussion, and write a Personal Application Assignment within two days of completing the learning experience.

Leddick (1993) writes that she connected a similar cycle with Deming's philosophy of continuous improvement. That cycle, named Plan-Do-Study-Act (PDSA) "provides a way to work on improving teaching and learning in the classroom during instruction" (p. 1). Leddick linked the PDSA cycle with classroom assessment techniques, methods of assessing a student's progress without administering a test.

An educational consultant who worked with Deming for many years, Leddick (1993) has connected nine classroom assessment techniques proposed by Angelo and Cross (1993) with Deming's philosophy of continuous improvement.

The nine techniques Leddick (1993) outlines are Focused Listing; Background Knowledge Probes; One-sentence Summaries; Concept Maps; Invented Dialogues; Student Goals Ranking and Matching; Focused Autobiographical Sketches of Students as Learners; Punctuated Lectures--Listen, Stop, Reflect, Write, and Give Feedback; and One-minute Papers.

Focused Listing

Focused Listing assesses students' knowledge of factual material. Angelo and Cross (1993) identify Focused Listing as one of seven "declarative learning" (p. 119) techniques. Given a time limit, students list ideas that are significant to a "focus point" (p. 126) in the course.

Focused Listing can be used by the professor at any time during the instructional process. It is an easy, quick, and efficient method to assess student understanding. Angelo and Cross (1993) suggest that the instructor also build a focused list and compare it with those generated by the students.

Background Knowledge Probe

Another declarative learning technique is the Background Knowledge Probe described by Angelo and Cross (1993) as more detailed than the Focused Listing technique. A Background Knowledge Probe (Angelo & Cross, 1993) resembles an examination by asking students for feedback through multiple choice items or short answer responses. It is used to assess students' prior knowledge and can be used at the beginning of a course or before a new topic is introduced. Background Knowledge Probes give the instructor information about the students' readiness for the course or topic. This feedback allows the teacher to tailor the instruction to the students' needs.

Leddick (1993) recommends that professors analyze, for their own use, the students' responses by dividing them into four categories: "(-1) misinformed; (0) nothing relevant; (+1) something relevant; and (+2) significant knowledge" (p. 1).

One-sentence Summaries

A One-sentence Summary is a technique that provides exactly what its name implies--a one-sentence summary about a specific topic. Classified by Angelo and Cross (1993) as a technique that allows faculty to assess students' "skills in synthesis and creative thinking" (p. 181), the One-sentence Summary asks students to answer the following questions: "Who does what to whom, when, where, how, and why?" (p. 183). The students must respond with their answers in just one sentence.

Angelo and Cross (1993) suggest that the professor draw slash marks between the critical elements of the students' sentences, assign a rating (for the professor's use only) to each, and tabulate those assessments on a matrix. Instruction can be adjusted after the matrix is analyzed for students' strengths and weaknesses.

Concept Maps

Concept Maps are also used to assess students' skills in synthesis and creative thinking (Angelo & Cross, 1993). Learners draw Concept Maps to illustrate "the mental connections that students make between a major concept the instructor focuses on and other concepts they have learned" (p. 197).

"Concept Maps," according to Pauk (1989, p. 212), "are word diagrams. They may be used to organize and to make visible, in a logical and connected manner...information." Concept Maps are drawn hierarchically with lines connecting main ideas and supporting details.

The Concept Map is a good technique to use with visual learners, although students with graphic skills that are not well-developed may find drawing a map frustrating (Angelo & Cross, 1993). Instructors should develop their own concept maps, but not be bound to them so closely that they miss innovative responses from their students' designs.

Invented Dialogues

Another classroom assessment technique for measuring a student's skill in synthesis and creative thinking is the Invented Dialogue, a technique that Angelo and Cross (1993) call "demanding" (p. 207) for both students and teachers. The Invented Dialogue "provides rich information on students' ability to capture the essence of other people's personalities and styles of expression--as well as on their understanding of theories, controversies, and the opinions of others" (p. 203).

One method of creating an Invented Dialogue is to have students create characters' dialogue by putting primary source quotes together in script-like form. The other, which is more difficult, incorporates reasonable invented quotes that fit the setting and the traits of the individuals the students are portraying (Angelo & Cross, 1993).

Student Goals Ranking and Matching

Student Goals Ranking and Matching is a technique used within the first or second class meeting. Students list their goals for the course, prioritize them, and estimate how difficult each goal will be (Angelo & Cross, 1993).

Professors use the student rankings by matching them against their own course goals. The data collected can show professors the "degree of fit" (Angelo & Cross, 1993, p. 290) between their goals and those of the students. Shared class goals may be formulated or even incorporated into the course syllabus.

Focused Autobiographical Sketches of Students as Learners

Like the Student Goals Ranking and Matching, the Focused Autobiographical Sketches of Students as Learners is classified by Angelo and Cross (1993) as a technique that "assesses students' self-awareness as learners" (p. 280). In a Focused Autobiographical Sketch a student concentrates on describing a previous course-related successful learning experience.

This technique is particularly effective in "high anxiety" (Angelo & Cross, 1993, p. 282) courses like statistics, speech, and mathematics. The Focused Sketch should be used simply to categorize the degree of relevancy of student learning experiences on the course.

Punctuated Lectures--Listen, Stop, Reflect, Write and Give Feedback

The Punctuated Lecture is a technique that assists faculty in "assessing students' course-related learning and study skills, strategies, and behaviors" (Angelo & Cross, 1993, p. 299). It is designed to provide immediate feedback about how the students are learning from a classroom instructional strategy.

The teacher stops the activity before it is completed and gives the students time to think about what they were doing during the learning exercise. The students write down their thoughts and any insights they may have about their own learning and give them to the teacher. Although the Punctuated Lecture technique may also pinpoint distractions, its purpose is to prompt students to monitor their own effectiveness as learners (Angelo & Cross, 1993).

Minute Papers

A Minute Paper, like Focused Listing and the Background Knowledge Probe, is another "declarative learning technique" (Angelo & Cross, 1993, p. 119). This popular technique can be applied with most instructional delivery methods--lecture, lab, visual media, and field trips. It simply asks students to respond within one minute to one or two questions at the end of a class or activity such as: What was the most important thing you learned today? What was the most difficult thing for you to understand? What questions do you still have remaining?

These assessment techniques, and others like them, provide an avenue for continuous assessment in the classroom. For assessments to be made, information must be collected and used in an appropriate manner.

Collection and Use of Information

Deming stresses the collection and use of relevant information as "essential to the transformation of American business" (Walton, 1986, p. 96). Learning about the tools used in continuous quality improvement efforts is an integral component of implementing Deming's philosophy and principles.

Many techniques for problem-solving, or "new tools for critical thinking" (Hudson, 1992, p. 22) have been developed. Classroom educators, as well as people in business or manufacturing organizations, have used problem-solving tools like brainstorming, affinity

diagrams, cause and effect diagrams, interrelationship digraphs, force field analysis, flowcharts, run charts, scatter diagrams, control charts, histograms, and Pareto charts.

Brainstorming

Brainstorming is a technique used by a group to create as many ideas as possible in a short time. For instance, when Teal's (1992) students studied fear in the classroom they initially used brainstorming to list all their ideas about academic fright. Brainstorming can be structured to guarantee that each participant has an opportunity to contribute or can be unstructured so that ideas are listed as they occur. Essential rules in brainstorming are: there is no criticism of anyone's ideas and every idea is recorded exactly as it is spoken by the participant (Brassard, 1988).

Affinity Diagram

An affinity diagram will most likely be constructed after a brainstorming activity is completed. Constructing an affinity diagram is a creative process of sorting ideas placed on cards into related groupings rather than discussing them (Brassard, 1989).

A completed affinity diagram is similar to the Concept Map described by Pauk (1989). Main ideas are usually placed at the top of the diagram with connecting lines running from them to supporting details. An affinity diagram is designed to illustrate broad categories or issues (Brassard, 1989). Romero-Simpson (1992) used an affinity diagram to illustrate information collected on his students' subjective assignments.

Cause and Effect Diagram

Walton (1986) defines an effect as a "desirable or undesirable situation, condition, or event produced by a system of causes" (p. 99). A cause and effect diagram shows in graphic form an effect as the end result of numerous causes. For example, Hau's (1991) students created a cause and effect diagram to illustrate the six main areas that contributed to the quality of their class. A cause and effect diagram is sometimes referred to as a Fishbone diagram, because of its shape, or as an Ishikawa diagram for its originator Kaoru Ishikawa.

Interrelationship Digraph

Causes and effects can also be illustrated on an interrelationship digraph. Each idea or issue in an interrelationship digraph is represented by a geometric figure. Each is then connected to all related issues or ideas by a line. As indicated by its name, an interrelationship digraph shows relationships between issues and facilitates identification of key factors (Brassard, 1989).

Information collected from students and illustrated on an affinity diagram was also analyzed by Romero-Simpson (1992) on an interrelationship digraph.

Force Field Analysis

Force Field Analysis is an approach to viewing change "as a result of a struggle between forces that are seeking to upset the status quo" (Lewin in Brassard, 1989, p. 73). A completed Force Field Analysis is a chart with a vertical line drawn through the center. On the left side of the line are the "driving forces" (p. 73) moving the circumstances toward change. To the right of the line are all the reasons, "restraining forces" (p. 73), that impede change.

Flowchart

Flowcharting is used to illustrate steps in a process. A flowchart is often the first technique used in problem-solving because it shows the current status of a the process in question. When the desired process is also charted, improvement strategies can be addressed (Walton, 1986). Cornesky (1993) describes an economics instructor's use of a flowchart. The instructor, with a team of students and business people, charted the testing system in an introductory economics course. The flowchart revealed that there was no feedback connection for students who failed exams. As a result, the team recommended changes that led towards an improved learning system.

Run Chart

A run chart is constructed to illustrate trends in a process or shifts in an average. A run chart is simple to produce because data is plotted on a graph as it occurs. After an average is determined, a horizontal line is drawn across the graph to represent that average.

Over time, an equal number of points fall above and below the average. Concern should not be raised over this variation unless a "run on one side of the average...indicates a statistically unusual event" (Brassard, 1988, p. 31). Then an investigation should ensue. The economics instructor who used the flowchart to determine what changes needed to be made to improve student learning in her class also used a run chart (Cornesky, 1993). The instructor's run chart illustrated the percentages of students receiving high grades both before and after the changes were made.

Scatter Diagram

When a scatter diagram is created it shows relationships between two variables. It also charts the strength of the relationships. Correlations illustrated on a scatter diagram may range from positive to negative (Brassard, 1988). A scatter diagram described by Cornesky (1993) was used to determine if there was a relationship between the grades of students in a biology course and the number of hours per week they spent watching television.

Control Chart

A control chart incorporates the data from a run chart, but includes statistically determined upper and lower control limits on either side of the process average. Special cause variation is plotted above or below the control limits and can be easily identified on a control chart. Common cause variation is illustrated between the control limits (Walton, 1986). Bradley (1993) suggests using a control chart to monitor the teaching of an algebra curriculum. In this case curriculum objectives were plotted as the process average with a 10% increase and 10% percent decrease in objectives taught forming the upper and lower control limits.

Histogram

A histogram is a bar graph that illustrates frequency distribution information and displays the amount of variation in a process (Spanbauer, 1992). Cornesky (1993) used two histograms to show relationships between grades of students before and after studying as a group. Because a histogram is useful in predicting improvements in a stable system, Cornesky (1993) suggests using it with a control chart.

Pareto Chart

A Pareto chart is also a bar graph that displays frequency data. It differs from the histogram by illustrating information in decreasing order of significance and, thus, is useful in determining priorities (Brassard, 1988). Using Pareto charts to illustrate why students

withdraw from an introductory statistics course, Stephenson (1985) showed currently enrolled students that a commitment of time was, and most likely will be for them, critical to success in the statistics course.

Quality tools, such as those just described, are useful for displaying data collected in the continuous improvement process. Most of them can be applied in the educational system.

Summary of Selected Literature

Authors of current literature submit that Deming's philosophy and principles can be applied to the instructional process in higher education. They assert that students are customers and classroom educators are facilitators of the learning process. Writers outline a variety of instructional strategies and techniques that can be used by educators who want to utilize Deming's ideas in their classroom settings.

Deming criticizes the system of education which he defines as "a system of schools (public schools, private schools, parochial schools, trade schools, [and] universities)" (1993, p. 64). He says that education should be "a system in which these groups work together to achieve the aims that the community has for the school--growth and development of children, and preparation for them to contribute to the prosperity of society" (1993, p. 64). In that educational process students "from toddlers on up through the university take joy in learning" (1993, p. 64).

As Deming discusses the negative effects of extrinsic motivation, he states that students lose the joy of learning by focusing on top grades. "No one," he writes, "can enjoy learning if he must constantly be concerned about grading and gold stars for performance" (1993, p. 112).

"Our educational system would be improved immeasurably by abolishment of grading," Deming continues (1993, p. 112). "The evils of grading" (1993, p. 149) prohibit improvement of the educational system. "A grade," he says, "is only the teacher's subjective opinion" (1993, p. 151). Deming contends that grades and rankings promote humiliation and demoralization of individual students.

Deming's idea of eliminating grades is not new. Marshall (1968) writes about his experiences with keeping students' progress records without assigning letter grades. A medical professor emeritus, Marshall's department used a non-graded approach to assessment for thirty years. In recent years interest in alternative kinds of assessments and curriculum on which that assessment is based has increased as indicated by the writings of such educators as Marzano (1993) and Grady (1992).

Deming proposes that "win, win, [is] needed in education" (1993, p. 152). He recommends that learning be integrated into meaningful contexts, and that competition between learners be eliminated in favor of cooperation. "Cooperation," he says, "builds character, is basic to human nature, and makes learning more enjoyable and productive" (1993, p. 155).

For the most part, the application of Deming's quality philosophy and principles has not yet impacted the teaching and learning functions of colleges and universities (Seymour & Collett, 1991). Quality movements so far have "ignored the single most critical element in educational change--the faculty...It is the faculty, after all, who...control quality. If the classroom doesn't work, the college doesn't work, no matter how well-managed the support services" (Cross, 1993, p. 16).

Although literature about the application of Deming's philosophy and principles to classroom instruction is limited, there appears to be interest at the postsecondary level for linking Deming's work with the teaching and learning process. This interest, combined with the scarcity of Deming applications to instruction, indicates a need for further research.

This study aims to provide some of that needed research.

CHAPTER III

RESEARCH METHODS

This chapter begins with a set of questions that were explored in the research study. Because the purpose of the study was to understand why and how the selected respondents have applied Deming's philosophy and principles to their instructional process, the research questions were best answered by qualitative methodology. Qualitative methodology is described in this chapter.

The second section of the chapter focuses on the qualitative research methodology used in the study. Sources of data, methods of data collection, and methods of data analysis are explained.

The chapter concludes with evidence of the study's trustworthiness, the extent to which the findings can be trusted. The issue of validity is addressed.

Research Questions

The primary purpose of this study is to identify, examine, describe, and understand the attitudes, teaching strategies, teaching techniques, and assessment methods of selected postsecondary educators who claim to be applying the philosophy and principles of Wm. Edwards Deming in their classroom instruction. Research questions were defined before the investigation began. They were projected in advance based on considerations of the teaching and learning process and by using the information provided by the focus group and the follow-up questionnaire. Stated in non-interrogative form, the questions are:

1. Explain why the selected respondents decided to adopt Deming's philosophy and principles in their classroom instructional processes.

2. Describe the attitudes the selected respondents have about the teaching and learning process.

3. Identify and describe the ways the respondents perceive quality in the classroom.

4. Explain how the respondents apply Deming's principles and philosophy to the instructional process.

5. Identify, describe, and categorize the strategies and techniques, used by the selected respondents, that reflect Deming's philosophy.

6. Explain how the respondents determine the effectiveness of their strategies and techniques.

7. Describe how students perceive the quality methods of the educators selected as respondents for this study.

8. Explain what effects, if any, the college or university where the respondents are employed has on their attempts to apply Deming's philosophy and principles to the instructional process.

9. Describe the appropriateness of applying Deming's philosophy and principles to postsecondary classroom instruction.

Methodology

Before the research could begin, the study was approved by the university's Human Subjects Review Committee. Studies involving human beings as research subjects must receive official sanction from the university. The Human Subjects Review Committee is the group that authorizes the gathering and use of data from human subjects for research purposes.

Because the primary purpose of this study is to understand the attitudes, teaching strategies, teaching techniques, and assessment methods of selected postsecondary educators who are applying the philosophy and principles of Wm. Edwards Deming in their classroom instruction, an emic or insider perspective is necessary. According to Patton (quoted in Merriam, 1990) collection of detailed, in depth data requires that the investigator get "close to the phenomenon under study" (p. 68).

In this study the insider perspective is gained through closely studying the respondents in their instructional roles as classroom educators. This is accomplished primarily through interviews with the major respondents and their students and through classroom observations.

The emic perspective is also reflected in the style of writing used in this chapter, Research Methods, and in the fourth chapter, Research Findings. First person is used in both chapters as recommended by Glesne and Peshkin (1992), Wolcott (1990), and Blount (personal conversation, July 5, 1994).

Formulating advice to researchers, Glesne and Peshkin (1992) state:

> Writing in the first person singular fits the nature of qualitative inquiry....The presence of...'I' in your text reflects your presence in your research setting....yours is not a disembodied account that presumes to be objective by virtue of omitting clear reference to the human agent who lived through a particular research experience....Moreover, it would be foolish for you to hide behind veils of awkward sentence construction, particularly when your ideal is graceful, clear, and cogent writing (p. 167).

Sources of Data

Data, "ordinary bits and pieces of information found in the environment" (Merriam, 1990, p. 67), collected and used in the research study were obtained from college and university professors and instructors, authors of literature about quality in education, other professional educators, students, advisory committee members, observations of classroom instruction, and field notes. Secondary data sources include a variety of documents revealed throughout the research process.

Instructors and Professors

To facilitate the process of developing a conceptual model of a Deming educator and to assist in the development of research questions, I invited a group of higher education professionals, who understand Deming's philosophy and principles, as well as the teaching and learning process, to participate in a focus group. The group, composed of two university professors and two former community college instructors, generated a list of characteristics they felt should be possessed by educators who use Deming's philosophy in their classroom instruction.

The four educators were selected because they have taught at the postsecondary level, all at universities. Two of the group have also taught at community colleges.

All of the individuals in the focus group have knowledge about quality issues. The two university professors have taught courses about quality management in their respective colleges. One focus group member serves as a member of a state agency quality team. The fourth person is involved with quality issues in business and industry as part of his position in the university's research park. Appendix A lists the names and titles of the persons who formed the focus group.

Focus groups provide "useful data with relatively little direct input from the researcher," Morgan (1988, p. 21) writes. Because the group selected has similar backgrounds in education and knowledge of quality issues, a small group of four, according to Morgan, is allowable. Morgan reports that "the more homogenous [the group] in terms of both background and role-base perspectives, the fewer you need [for a focus group]" (1988, p. 42).

Authors and Other Professional Persons

The focus group's categorized items were mailed to 18 individuals knowledgeable about Deming's work and the instructional process. Of the 18, 13 have published books or articles about quality and its relationship to learning. The other five are recognized within their institutions as people who have knowledge about both Deming's philosophy and principles and about the postsecondary instructional process. Fourteen responses were

returned. A copy of the questionnaire, the accompanying letter, and the names of the 14 people who responded to the survey are shown in Appendix B.

Major Respondents

Three major respondents, selected because they have been recognized as people who are applying Deming's philosophy and principles in their classroom instructional process, were identified. I received assistance in the identification from several professional people associated with the respondents. Identifications were made either through face-to-face or telephone conversations with respondents' colleagues. The respondents were located in three different ways.

The first major respondent was identified by several persons on the university campus as an individual who uses some of Deming's principles in the classroom instructional process. Recommendations about the respondent came from several of his peers including other faculty, the past president of the local chapter of AQP (Association of Quality and Participation), and the university's training and development officer.

The first respondent's teaching assignment includes sections of an introductory statistics course, as well as departmental coordination responsibilities for that course. In addition, he teaches upper-level undergraduate courses in statistics and is an member of the Statistics Department graduate faculty.

In a monthly newsletter devoted to quality in higher education, I discovered articles written by the second major respondent. After I contacted him about his work and interest

in Deming, the interim president of the respondent's university, a public institution devoted primarily to teaching, verified the professor's interest in applying Deming's philosophy and principles to the classroom setting.

The second respondent has published a monograph about applying Deming's Fourteen Points for Quality Improvement to the teaching and learning process. He has a diverse background in public school teaching and administration. At the time of the study, this respondent's title was Associate Professor of Educational Administration. His assignment included teaching graduate courses in educational administration, as well as supervising student teachers.

The third major respondent was located after I contacted the director of the quality academy located in the technical college where the respondent is employed. The director immediately recommended this instructor as a person who is applying Deming's philosophy and principles to the teaching and learning process.

The third respondent chairs and teaches in the Quality Improvement Process Specialist program at a technical college. Graduates of the program earn Associate of Applied Science degrees. This respondent was hired nearly four years ago as the first staff person in the two year vocational education program. At that time, he was charged with the responsibility of integrating quality concepts into the teaching and learning process. Prior to becoming an instructor, he had worked on a successful quality team within a major industry.

When the research findings were reported, anonymity for the respondents was assured through the use of pseudonyms. The respondents were not apprehensive about being

identified. They expressed a desire to share their ideas with other classroom educators, and wanted to be acknowledged for their parts in the study. A sample of the release forms they signed is displayed in Appendix C. Their names can be obtained by contacting me.

Student Respondents

Three groups of students participated in the study. Students in the first group were undergraduates enrolled in the respondent's statistics courses.

The second group of students was enrolled in a graduate level curriculum class taught by the respondent. Most of the students in this group were teachers in elementary or secondary schools.

The third group of students was enrolled in one or more classes within the Quality Improvement Process Specialist program. This was a group of working adults and included people who had few college credits, as well as an individual earning a masters degree in education.

A copy of the student assurance form, given to all the students interviewed, is in Appendix D.

Advisory Committee Respondents

Two members of the advisory committee for the third respondent's program were also interviewed. A copy of the release form they signed is in Appendix E. One individual,

chairperson of the advisory committee, held the title of Director of Quality Administration in a manufacturing company while the research for this study was being gathered.

The other advisory committee member, a former secondary marketing teacher, is his school district's Education for Employment Coordinator. At the time I talked with him, he still taught two courses: Quality Studies and Career Management. He was also a student in the respondent's technical college program, the person mentioned previously who was earning a masters degree.

Notes from Classroom Observations

Notes from classroom observations of the instructor and professors with their students in the educators' classrooms are used as another source of data for the study. Evidence that the instructor or professor was exhibiting the attitudes and characteristics expressed during the interview process is the focus of these observations.

Field Notes

Written notes, containing my thoughts and observations as the study progressed, are used to support the study. These notes were written at various times: before, during, and after the interviews and observations.

Documents

Numerous documents were collected during the research process. Documents, as described by Lincoln and Guba (1985), are any non-reactive materials grounded in the research setting but not prepared specifically for the research study. In this study, I collected the following documents: course syllabi, study guides, letters from students to the classroom educators, survey forms, tools used by respondents to analyze and display survey data, books about quality, and a video tape.

Methods of Data Collection

Data have been collected from the following sources: a focus group interview, a questionnaire, major respondent interviews, student interviews, advisory committee interviews, classroom observations, field notes, and secondary source documents.

A series of interviews is the primary method used for data collection in this study. Interviews yield data from individuals and groups that is "valid and reliable information" (Marshall & Rossman, 1989, p. 82). Interviews, as described by Webb and Webb (quoted in Merriam, 1990) are "conversations with a purpose" whereby an investigator can "find out...those things [they] cannot directly observe...feelings, thoughts, and intentions...and enter into another person's perspective" (p. 72).

The interviews conducted in this study allowed me to gather related information from several sources. I was also able to ask follow up questions during the interviews or after

reviewing the interview transcripts. In addition, I was able to verify information obtained in the interviews with my observations.

Focus Group Interview

During the early days of the research study, I convened a focus group, composed of four professional people who understand Deming's principles and philosophy, as well as the instructional process. The question I posed at the beginning of the two-hour group session was: "What traits do you believe a Deming instructor or professor should possess?" The group brainstormed items, writing each item on a 5" X 8" white card, and placing it on the wall before them. Then they created an affinity diagram by moving the cards into like categories. The items were grouped into seven categories of characteristics of individuals who apply Deming's philosophy and principles to their classroom instructional processes.

Questionnaire

An open-ended questionnaire (Marshall & Rossman, 1989) was mailed to 18 people. The questionnaire contained the items generated by the focus group. It was divided into seven categories and 37 subcategories of characteristics of a Deming educator produced during the group's brainstorming session. Recipients of the questionnaire were asked to review each item within each category and take one of three actions: retain the item as written, change the item, or delete the item.

Fourteen of the 18 questionnaires were returned. Twelve came from the people who had been contacted originally, but two of the responses came from instructors who had been asked to reply by the individuals to whom the items had been sent. I received suggestions for additions, deletions, or changes in 36 of the 37 subcategories. They were recorded on a form I created for logging the recommendations.

Based on the suggestions of the 14 people who responded to the open-ended questionnaire, I clarified, expanded, and incorporated into the focus group's original list the additional characteristics of an educator who uses Deming's philosophy and principles in the instructional process. The results were used to help me identify Deming characteristics possessed by the respondents.

Major Respondent Interviews

Individual interviews were used for data collection with the major respondents. Three interviews were conducted with the first respondent in his university office. Each of the three interviews lasted between 30 and 45 minutes.

The three interviews with the second respondent were conducted in a library conference room at his university, in his off-campus classroom, and by telephone. The first interview, held in the university conference room, was nearly two hours in length. The second was much shorter, only about 20 minutes. The telephone interview had a duration of approximately 30 minutes.

With the third respondent all but two of six interviews were conducted by telephone. The telephone interviews varied between 25 and 45 minutes in length. One interview conducted face-to-face lasted two hours, beginning in the respondent's college office and concluding in his home. The other one took place the same evening I interviewed and observed his class at the off-campus center where the class was being held. It lasted several minutes.

All of the interviews with the major respondents were tape recorded. Later I transcribed each interview.

The interviews with each respondent were loosely structured. I began by asking some standardized questions of each person such as:

1. Tell me about your professional and educational background and experience.

2. How did you become interested in Deming's work?

3. Why did you decide to adopt Deming's philosophy, or portions of it, to your instructional process?

4. How have you adapted Deming's philosophy and principles to the teaching and learning process?

After the introductory questions were discussed, the questions addressed the individuals' responses to those questions. Exploration of each person's attitudes and actions continued.

Student Interviews

Interviews were also conducted with students who were enrolled in classes taught by the three educators. The questions I asked of the students were designed to verify information obtained from the classroom educators.

Six students who had been in the first respondent's statistics classes were contacted individually by telephone because I did not have the opportunity to speak with them as a group. The students were asked questions, such as the following, to discover their thoughts about the quality principles the respondent used in his instructional process:

1. When you took statistics from Dr. Joe (pseudonym) what kind of surveys do you remember him giving to the class?

2. After the surveys had been completed, how did Dr. Joe give you the information from the surveys?

3. Did you understand the information?

4. What did you think about this activity?

A group interview, lasting about an hour, was conducted with graduate students in the second respondent's Curriculum Planning class. Students in this class had been exposed to Deming's work through references included in the syllabus and prior discussions with the professor. Several of the students were incorporating Deming's philosophy into their research papers. Because of their knowledge base, my lead question for the students was "How do you see Deming's philosophy and principles applied, or not applied, in this classroom?"

The third group, members of an accelerated learning program set up by the college for Quality Improvement Process Specialist degree students, was interviewed in much the same manner as the previous group. This group, too, had some knowledge of Deming's philosophy and principles. The interview was nearly an hour in length with 12 of the 16 students present participating in the discussion. As with the previous group, the initial question I posed was "How does Rob [pseudonym] demonstrate Deming's influence during the instructional process?"

There was no time limit set for either of the group interviews. In both classes, the students began to repeat themselves, a sign that the interview should conclude, after about 45 minutes of conversation. Interviews with the students, as with the respondents, were tape recorded and transcribed for use in the research study.

Advisory Committee Interviews

Two members of the third major respondent's program advisory committee were interviewed. As with the other interviews, I tape recorded and later transcribed the conversations. One interview, with the chair of the committee, took place in a conference room at the manufacturing company where he worked. It lasted nearly an hour. I interviewed the second member of the advisory committee by telephone for 40 minutes.

With the advisory committee members, I asked questions about the respondent and his relationships with the committee. They were asked to view their interactions with him as if the advisory committee meetings were an instructional activity led by the major

respondent. The initial question I posed for both individuals was "How does Rob (a pseudonym) demonstrate Deming's philosophy with the committee?" Much of the discussion with both committee members focused on the newly-adopted assessment policy, so many questions were specific to that topic.

Classroom Observations

All three respondents were observed in their classrooms. My purpose was to scrutinize the classroom behaviors of the major respondents, thereby supporting or weakening the information each had revealed during the interview process. I was present in the classrooms as an "observer as participant" (Merriam, 1990, p. 93). Although my major role was to observe and gather information, I was a participant because my presence was acknowledged by the respondents and their students. Students in the classes were aware that I was collecting data about the classroom educators through my observations. The level and amount of information revealed, therefore, was controlled to some extent by the students present.

A "global approach" (Oliva, 1989, p. 488) to the classroom was the type of observation I adopted in this study. My purpose in the observations was not only to look for evidence to support or contradict what the respondents had said during the interviews, but to make "generalized assessment[s] of teacher performance on a wide variety of teaching skills...generic in nature" (Oliva, 1989, p. 489).

Experienced observers of classroom instruction are "connoisseurs of teaching" (Oliva, 1989, p. 489) and may not use quantitative rating instruments. Instead, they are able to "appreciate what happens in the classroom...and interpret the quality of [the professors' or instructor's] performance" (Eisner, quoted in Oliva, 1989, p. 491). My experience as a classroom observer and evaluator is detailed later in this chapter under the heading "Investigator Perspective."

According to R. P. Manatt (personal communication, May 17, 1994) experienced evaluators can make assessments of teachers on the basis of two classroom observations. Manatt recommends that each observation be one hour in length, but agreed that two hours of time in one block meets this criteria.

Four classroom observations were made during the study. I observed two fifty-minute undergraduate statistics classes taught by the first major respondent. The first observation took place during the initial class meeting and the second occurred three weeks later. Both were held in a classroom building on the university campus.

After two interviews were completed with the second major respondent, I made a two-hour observation of his class of about 25 graduate students in an educational administration course called Curriculum Planning. This class met in the university's attendance center located on the campus of a private college about 80 miles north of the university.

My fourth classroom observation took place in one of the technical college's community centers about 10 miles from the main campus. Sixteen students and two other

people attended the two-hour session. The two others were teachers, but both participated in all the class activities.

Field Notes

Also included were my continuing observations noted while I interviewed and observed the respondents. These written notations were used as research data.

Documents

Many documents were gathered during the research study. To judge the initial value of each piece of document data, I asked two questions suggested by Merriam (1990):

1. Does the document contain "information or insights relevant to the research question"? (p. 105).

2. Is the document easily attainable?

Once these questions were answered affirmatively, I further examined each document, using a form recommended by Whitt (personal communication, September 22, 1992).

Methods of Data Analysis

Data analysis was concurrent with data collection. I analyzed the data from the interviews, observations, field notes, and documents as they emerged. Data analysis was accomplished through use of unitizing and categorizing as described in the constant comparative method (Lincoln & Guba, 1985).

As a first step, the constant comparative method suggested unitizing the data. Unitizing consisted of breaking the data into the smallest possible meaningful thought units.

Each unit was placed on an index card coded by color and number to identify its source. I constructed the units from the group and individual interviews, the follow-up questionnaire, observations, and documents.

Units were placed in similar groups or categories. I used an inductive process, looking at each unit to determine if the unit was the same or different from another unit. If a unit was like another, it was placed with the card displaying the analogous unit. Thus, a category was created. If the unit was unlike any other unit, a new category was established.

The categories that emerged during the process were examined in light of Deming's philosophy and principles. I compared data collected in the study to Deming's theory of profound knowledge as the categories emerged.

Trustworthiness

Trustworthiness of the study is established by insuring that the research process, findings, and interpretation are representative of the data. Lincoln and Guba (cited in Merriam, 1990) draw comparisons between quantitative and qualitative research by using the term "truth-value" (p. 166) for internal validity. They call external validity transferability and state that reliability means consistency. In this study all three of these issues--truth-value, transferability, consistency, as well as ethical considerations--are addressed.

Truth-value

In qualitative research, reality is regarded as "holistic, multidimensional, and ever-changing; it is not a single, fixed, objective phenomenon waiting to be discovered, observed, and measured" (Merriam, 1990, p. 167). The way in which people build their realities and how those realities are observed formed the basis of the research strategy. For this reason, I have ensured the truth-value or internal validity of this study in several ways: clarification of my perspective, respondent debriefings, peer review examinations, and triangulation of data sources.

Investigator's Perspective

My experiences as a community college instructor and administrator, and my background prior to those experiences, guided me towards this research study. For as long as I can remember, I have been interested in the teaching and learning process, perhaps because I am the daughter of a school superintendent and a kindergarten teacher.

I began working with adults nearly 25 years ago. That experience, teaching basic education classes in an urban community center for the adult education division of the local community college, led me within a few years to a position as an instructor in a college learning center. There I developed and facilitated the delivery of individualized competency-based curricula to meet the academic needs of students preparing for college.

While attending the Kellogg Institute for the Training and Certification of Developmental Educators, I became aware of the resources available to classroom educators

about teaching and learning styles. My experience with the Kolb Learning Styles Inventory, the Myers Briggs Type Inventory, the Canfield Learning Styles Inventory, and the Canfield Teaching Styles Inventory convinced me that teachers and students not only adopt different teaching and learning styles, but that all styles are valuable.

After participating in a national leadership development project for community college women, I became interested in sharing my knowledge about teaching and learning with other teaching professionals. My professional objective at that point was to develop the background and training necessary for a career in administration of community college academic programs.

That ambition was realized as I became a director of 65 academically diverse community college faculty. Included in that group were liberal arts instructors, instructors in 22 vocational education programs, and developmental education instructors.

It was in this role that I gained my experience in classroom observation. Although I have evaluator approval, required by the Iowa Department of Education for all community college faculty supervisors, and gained through university courses, it was through practice that I achieved my experience in observing the instructional process. During the time I was faculty director, I made more than 100 classroom observations.

Besides selecting and mentoring new faculty, as well as assisting experienced instructors with their professional development objectives, I was responsible for evaluating faculty instructional effectiveness. About half of the observations I did were required by the collective bargaining agreement.

The required observations were used for both formative and summative purposes. The observations were utilized as tools to assist new faculty in developing their instructional skills. But at the end of an instructor's second year of employment, the written evaluations that accompanied the observations were part of the data used to determine if the instructor should be given a continuing contract, e.g. tenure.

The other half of the observations were strictly formative. They were used with full status, tenured faculty who wanted another professional to watch them in their classrooms and make suggestions for improvement. On several occasions, these observations helped me to link new instructors with experienced instructors in a mentoring relationship.

My commitment to improving the learning process for students by helping faculty led to my interest in Deming's management theory. Deming's philosophy and principles reflected my own leadership style, one of shared decision-making and empowerment of other people. His emphasis on a cyclical pattern of continuous improvement coincided with my personal philosophy of learning and the variations in individual learning styles.

Thus, the investigator perspective reflected in this study stems from my conviction that students should be provided with an environment that not only promotes learning, but makes it enjoyable as well.

Respondent Debriefings

After the interviews I reviewed the transcripts of the interviews and clarified information revealed in the interviews by discussing it with the major respondents. Further questions were asked when necessary.

The major respondents and the advisory committee members also received draft copies of the study for their consideration. They reviewed the draft and discussed discrepancies or inaccuracies with me.

Peer Review Examinations

Two of my peers, persons who have also done qualitative research studies, assisted me in debriefing. These sessions gave me the opportunity to review research findings with persons who gave critical feedback but were not involved with the data collection.

Triangulation

Triangulation of data sources is used to corroborate research findings. Sources used to triangulate were the interviews, a questionnaire, observations, field notes, and documents. Triangulation was accomplished by using "multiple copies of one source" or "different sources of the same information" (Lincoln & Guba, 1985, p. 305). After the unitizing and categorizing processes were completed, I merged the data into Deming's philosophy and principles.

Transferability

The intent of this study is not to generalize the findings, but to provide enough detailed description about the respondents and their attitudes, teaching strategies, teaching techniques, and assessment methods for the reader to understand how the respondents were applying Deming's philosophy and principles in the instructional processes. According to Lincoln and Guba (1985) "the degree of *transferability* is a direct function of the similarity between the two contexts" (p. 305).

Consistency

Consistency, also referred to as dependability, of the study means that the results make sense because they are based on the data collected (Merriam, 1990). To assure consistency, clear, complete explanations of Deming's theory support this study. Deming's theory, or philosophy as it is labeled in this study, is explained in the review of selected literature. The study's underlying assumptions are also explicitly stated in the introductory chapter.

Triangulation is not only used to establish the truth-value of the study, but contributes to its dependability as well. Detailed methods described in the study can be used by "other researchers...as an operating manual by which to replicate the study" (Goetz & LeCompte, quoted in Merriam, 1990, p. 173).

Ethics

Confidentiality is assured to the students participating in the study. They were guaranteed that they would not be identified by name, either in the written text of the study or to their professor or instructor. Appendix D is a copy of the assurance form given to each of the participating students.

Major respondents and the advisory committee members are identified in the text of the study by pseudonyms to assure their confidentiality. Because all of them are willing to share their ideas with other educators, they can be identified by contacting me.

CHAPTER IV

RESEARCH FINDINGS

In this chapter the characteristics of educators who use Deming's philosophy and principles in their classroom instructional processes are described. The characteristics emerged from the data collected during the research study, through literature reviews, group and individual interviews, observations, field notes, and resource documents.

In qualitative studies, such as this one, it is important that the investigator, as the primary instrument of data collection, becomes a central part of the research. To reflect that integral role, qualitative researchers Glesne and Peshkin (1992), Wolcott (1990), and Blount (personal conversation, July 5, 1994), recommend that reports of the research be written in first person. That is done in this report.

The chapter begins with an introduction to each of the three major respondents. The respondents and their working environments are described. Each person's introduction includes his interests in Deming, his ideas about quality systems, and his suggestions for change.

In the second section, characteristics of the respondents, revealed during the research process, are discussed. The respondents' attitudes about customers, their roles as classroom educators, and the attributes ascribed to them by other people are described.

The third section of the chapter reveals portions of each major respondent's instructional process, related to Deming's philosophy and principles. The section begins

with a description of planning for classroom instruction and continues through the final assessment of students' progress.

The relationship between Deming's ideas and the respondents' instructional strategies and techniques are analyzed at the end of each section of this chapter.

The Major Respondents

Three major respondents are interviewed in this study. At the time the research took place, all were educators at Midwestern postsecondary institutions. The introductions include descriptions of the respondents and the positions they held within their institutions. The development of the respondents' interests in Deming, their beliefs about quality, and their views about the systems within which they work are described.

In this study, the respondents are given pseudonyms. The first respondent is called Dr. Joe. Dr. Maynard M. is the name given to the second respondent. The third respondent is designated as Rob.

Introduction to Dr. Joe

Dr. Joe, as he liked to be called by his students, was a slender man with neatly trimmed greying hair and an equally well-kept salt and pepper beard. He was an athletic looking individual who resembled a tennis player or a long-distance runner.

As I entered Joe's office, he smiled and shook my hand. I was instantly at ease as he offered me a chair and cup of coffee. His desk was covered with papers; a computer sat

to his left on the corner of the desk. I saw a colorful graphic image moving idly across the screen and thought that I could be hypnotized by its ebb and flow. Books lined the shelves behind him. They had titles that made me shudder; all seemed to contain the word *statistics*! I wondered why this stat person had agreed to talk with me, a novice qualitative researcher.

Joe was a statistics professor at a large land grant university. He developed an interest in teaching while in graduate school. There, as a graduate assistant, he was assigned to teach several sections of statistics courses. Joe's teaching responsibilities were primarily at the undergraduate level. He had been the faculty coordinator for the beginning level statistics course for several years. In that capacity he taught at least one section of 100 students and coordinated the delivery of the course with three graduate assistants. As part of his responsibility he also taught upper level undergraduate courses.

About his interest in Deming, Joe said, "Well, being in the Department of Statistics, we knew about Deming for the longest time. And so it was just a question of whether we could apply the ideas of Deming to what we do." Joe went on to explain that his interest expanded when he talked with graduates working in companies using Deming's philosophy, when he taught a quality and productivity course, and while he was on sabbatical leave doing quality consulting in Australia. He revealed that before going to Australia he had written a manuscript about using quality tools in his introductory statistics classes.

Joe said that a quality system looks like "people, machines, and resources all together. Everything is part of the system. But, you don't manage people, you manage the system," he stated.

Joe explained that in order to manage a system you have to understand it. He told me that understanding begins with collection of data, which leads to measuring the inputs and outcomes of the system. "Applying quality to a production system fits well," he said. "You have inputs, you have a production process, you have outputs, and you can measure things on the way in and on the way out. That's not as easy in a university setting, in a teaching setting."

Dr. Joe talked about teaching large sections of classes. The system, the university where Joe worked, had many large classes in rooms that accommodated several hundred students. Joe stated that he couldn't do as much with quality strategies and techniques in classes with large enrollments as he could in smaller sections. "Students," he said, "need to be able to get in touch with you and talk with you. It's just not the same when you have large class section enrollments."

At Joe's university the administration had begun to look at quality programming. However, there was little evidence of encouragement for classroom educators interested in adopting quality principles to the instructional process.

Introduction to Dr. Maynard M.

Dr. Maynard M., an assistant professor of educational administration at a public university he described as "a teaching institution," and I met for the first time in the lobby of the university library. It was a warm, humid, mid-American summer day, so the lobby

was invitingly cool with its potted plants and shiny, ceramic-looking floor. My footsteps echoed as I walked across the tiles.

Maynard arrived shortly after I did. He was tall, about six feet, and well-proportioned. He wore glasses, had light hair, and smiled broadly as he came towards me. After introducing himself, he suggested that we go to the conference room he had reserved for our meeting. We chatted politely about the hot weather while the elevator made a humming sound on its trek to the fourth floor. Once there, we entered a room with a large conference table and nearly a dozen chairs. The windows and glass walls made the room seem open and airy. I already felt very comfortable there as we sat down in two swivel chairs next to one side of the table to begin our first face-to-face conversation. Later we walked across campus to his office, a small crowded room in a converted high school building, and I understood why he wanted to meet in the library conference room.

Maynard had come to the university after nearly 25 years of experience in elementary and secondary schools. He had been a teacher, a curriculum director, a principal, a superintendent, and a director of personnel and labor relations. When I asked him how his interest in Deming developed, he said:

> I read Mary Walton's book The Deming Management Method, and began to think about applying Deming's points to teaching. Then I read Goldratt's The Goal, Stephen Covey's The Seven Habits of Highly Effective People and Principle-Centered Leadership, and Max DePree's Leadership is an Art. I became aware that there is such a thing as principle-centered leadership and value-driven behavior.

"Deming's principles are value driven," Maynard proceeded. "They are the only proven, successful concepts to create learning organizations in the multi-billion dollar international market place. That, to me, is powerful authority."

Maynard discussed a quality system he believed is adaptable to education--the Cleveland Clinic. The Clinic had three guiding principles: better care of the sick, more training of those who serve, and more study of the patients' and workers' problems. "Those principles," Maynard said, "have caused the Cleveland Clinic to become a learning organization. I think the Cleveland Clinic principles are very compatible with Deming and with educational systems."

About higher education, Maynard remarked, "We have not been making any investment in studying the teaching-learning process. I think schools are primed to be learning organizations. I don't think they are. I think they are teaching organizations, imparting knowledge. But we are not spending time studying the problems of imparting and receiving knowledge, nor investing any significant amount in staff training."

There was an indication of interest about applying quality principles to instruction by individuals within the university, as evidenced by faculty attendance at a workshop Maynard conducted recently. But the university, as an organization, had made no commitment to a quality philosophy.

In addition, Maynard's department, headed by a "micromanager," a person who wanted to be involved in all details of the instructional process, placed restrictions on professors by setting requirements for each course. The department required that a research

paper be written, specified the amount and type of work to be done, and dictated the kind of examinations to be given.

Introduction to Rob

The technical college instructor, Rob, and I became acquainted by telephone. We had completed three phone interviews before we met in his office. I had driven several hundred miles to talk with students in his evening class only to find, as I arrived on campus, that all classes had been canceled because of high winds and below zero temperatures.

Rob's office was about 12 feet square, with a window taking up most of the space on the south wall. The office overlooked part of a parking lot and what I imagined was a green space, although everything was covered with snow. I could only assume how nice the green grass might look. Opposite the window were pictures of children and more pictures of groups of students on the desk, bulletin board, and bookshelves. A quote, attributed to Deming, "All models are wrong; but some are useful," hung on the wall nearby. On the shelves were many books by authors I recognized: Deming, Crosby, Juran, Walton, and Senge. A computer was placed on the workspace that extended from the desk to the east wall. It displayed the announcement about the campus closing. Two chairs, one centered in front of the desk and computer area where Rob sat, and the one I was seated on, completed the office furnishings.

Rob had a round face, broad nose, and dark brown hair cut straight across his forehead. He wore silver-rimmed, tinted glasses, was about six feet tall, and weighed about

200 pounds. He had straight white teeth that showed prominently when he smiled or laughed, which was often. Rob's son revealed to me later that evening that "Dad is almost 40!"

After we talked for about an hour in Rob's office, he invited me to his home for dinner. We continued our interview there, sitting in the living room with a fireplace on one end and the dining area on the other. The room was carpeted and I sat on a loveseat with Rob to my left on the sofa. I was facing the fireplace. Rob faced the window closed to the outside storm by mini-blinds. I could hear music and his two children talking in an adjoining room. The room smelled like spaghetti sauce which was simmering on the stove. I felt as if Rob had become my friend.

In 1985 the technical college received a request from a local corporation for training in quality. Although the college was not using quality principles internally at that time, the request spurred the administration to begin a training program for employees with Philip Crosby's Quality College. Incorporating the ideas that were presented in that training, the technical college adopted its own quality policies and programs.

The technical college had a "Quality First Policy" published in its catalog. The policy read:

> It is the policy of...Technical College to provide quality instruction and service consistent with the highest educational standards. We endeavor to provide precise, prompt and courteous service and instruction to our students, to one another and to the employers who hire our graduates and use our services (Passion for Excellence, 1993, p. 4).

Rob had been at the college as the first chair and instructor of the Quality Improvement Process Specialist (QIPS) Program for three and a half years. His interest in quality developed in a company where he was a team facilitator for a project group that ultimately saved the corporation nearly $10 million. That experience, combined with his concurrent undergraduate study in applied behavioral sciences and organizational effectiveness, established his interest in Deming's work.

Instructor and program chair Rob talked about the quality initiatives taking place in American industry. He pointed out that what is happening now is just "the first phase" of the quality movement. Successful organizations, he explained, have moved into a second phase of application, and then into a final phase where quality control becomes absorbed into the organization. He stated that embracing quality processes becomes the way of doing business.

Rob talked about businesses that have "elaborate quality departments." He said, "If quality makes sense in the long-term, they're going to dismantle their quality departments. They're going to disappear because they won't be needed. Quality will take over the whole organization."

Rob did not believe that quality ideas were new, but rather that they were "basic stuff put in different packaging." He laughed about how we in the United States had difficulty recognizing quality principles, which originated here with Deming, until they "came back from a foreign country."

Rob criticized companies that contend quality programs don't work, saying that the reason quality programming doesn't work is that the companies have not committed themselves to quality principles and processes. "They had expectations about what it would do for them in the short term and those turned out not to be true. They were looking for instant, short-term results. It takes a long-term commitment. This is culture change," he said emphatically.

Rob pointed to his own college as an example of the quality philosophy at work. He cited the multi-year faculty bargaining agreement as an illustration of the positive environment at his college. As he invited me to "come on over here and interview the people who have been part of our win-win bargaining teams," he pointed to the fact that the faculty and board were in their second multi-year contract. Previously they had gone without a signed agreement at the beginning of each academic year.

As Rob talked about the college environment he said, "It has its challenges. Having been in three different environments, I realize that I like where I am now best. I like the challenges that are here." Rob made additional comments about the educational system:

> A lot of the writings now talk about what we are doing in teacher training institutions. We are perpetuating the same practices that we are thinking about right now as not effective. So we've got to be able to impact those organizations. And that's part of the problem. Our educational institutions for teachers are cranking out the same old stuff.

Rob continued to criticize the educational system by pointing to Deming's philosophy of continuous improvement. He talked about teachers who can't adapt to a new

environment, "so they step back into the way in which they are the most comfortable. It's easier for them to not change than it is to change," Rob concluded.

Rob talked about students who memorize material, mimicking what instructors want to see on exams, and teachers who measure students' testing skills. "Very often in the traditional classroom," he said, "we teach for the test. We use multiple choice exams or what one of my teacher students calls 'mystical choice' tests." Rob continued:

> Be careful what you measure, because that is what you will get. If you are measuring the ability to do well on a mystical choice test then that is what you are going to get, people who will work to do well on the mystical choice, not to necessarily learn. Learning is secondary. Isn't that strange in an institution of learning?

Although not faced with large sections of classes, Rob cited the practice of giving grades at the end of a course as restrictive. He talked about Deming's proposal that grading be eliminated in the educational system. After telling me that he had been able to implement an alternate assessment policy for the QIPS program, he said, "But I still have to go through the hoops. I still have to give students grades because of the state requirement for grades."

Rob's focus on quality presented a special challenge. Although the state required that grades be assigned in all vocational courses, Rob and his advisory committee had developed an alternative grading and assessment policy.

Rob could have ignored the system and given all of his students A's. "But," he said, "somebody would eventually come to me and say, 'You're giving too many A's.'" He approached the problem directly by asking the administration to consider a new assessment policy for the QIPS program.

Rob contended that he wasn't "intimidated by the system" because he was not "vested in the system." I wondered, as I had wondered numerous times before, if Rob's lack of experience as an educator before he came to the college had given him an advantage over those of us who have spent all of our professional lives in the "system." Perhaps, I thought, he isn't burdened with the same paradigms many of us have because his background is not in the educational field.

Analysis of the Major Respondents

Classroom educators who want to apply Deming's philosophy and principles to the instructional process can do so, as evidenced by the respondents in this study. Despite restrictions of the systems within which they work, the major respondents have all taken portions of Deming's theory and used them in their classroom instruction.

The respondents demonstrate that a classroom educator who wants to use Deming's philosophy and principles must first understand Deming's work. Educators must comprehend how Deming's philosophy and principles are applied in other working environments.

Professors and instructors who want to use Deming's philosophy in their classrooms, as demonstrated by the respondents, should have a sincere desire to apply Deming's work to the teaching and learning process. Educators must believe that Deming's ideas can be utilized in the classroom. They must be willing to take risks and make changes to adopt Deming's theory of profound knowledge to their instructional processes.

The Respondents' Characteristics

Through the interviews and observations, several of the respondents' personal characteristics that fit into Deming's profound knowledge and quality improvement points were revealed. The respondents' characteristics include their attitudes about customers, their self-described roles as classroom educators, and the perceptions other people held about the respondents.

Attitudes about Customers

In the focus group interview, the notion of educations' customers emerged several times. Because Deming used the term customer, it was used by the focus group and in this study. Some educators, however, substituted other words like client, consumer, constituent, and beneficiary for customer.

The focus group and the people who responded to the follow-up questionnaire all agreed that a "Deming educator identifies the customers of the teaching-learning process and assesses the customers' needs and expectations."

Dr. Joe's Customers

Dr. Joe identified three groups of "customers" for the instructional process: student customers, customers of the course content, and professors or instructors as customers. He described the first customer group:

> Students are the customers of course presentation, how the course is conducted. They are not the customers for course content. They haven't taken the course and don't know anything about the subject, to determine what is relevant and what isn't. A lot of instructors will say 'I don't want to turn my class over to the students.' But, no, this is just in terms of presentation, how you're coming across. It has nothing to say about content. The students don't make a decision on content. That's still up to you. Some instructors might have difficulty implementing these ideas because this is a different way of thinking. You have to make some decisions in terms of when is the student the customer and when is the student not the customer.
>
> Another difference with this idea of looking at students as customers is that if you ask them for feedback on your presentation, you don't have to wait five years to figure out what you are doing right and what you are doing wrong. You ask them periodically what's hard and what's not hard. Is the point getting across? Is the point muddy? You check the learning process as you go along, and you make adjustments. If you ask students what is the most confusing thing, and it is also the most important thing for that lecture, and it comes back that they are really confused about that, then you have to do something. Make a change, get away from that syllabus, that strict syllabus. You have to say, 'OK, this is really important. Let's go back and make those changes.'

Joe stated that instructors must identify their customers of the content. Joe contended that this second group of customers might be other instructors, other academic departments, graduate schools, people in industry, and society in general. Following the identification, customers must be asked about their expectations of students leaving a course or program.

"For instance," Joe said, "with STAT101, a prerequisite for a lot of other courses, we identified the customers as other instructors and departments. Then we asked them what they expected their students to have when they exited 101." Joe expanded by citing the importance of listening to the customers of the content, and incorporating their input into the curriculum.

Customers of the content for courses that educate students "in a broader sense," are more difficult to identify than are those of technical and vocational courses, Joe asserted.

"What, for example, should the students know about history when they finish a course? Who are the customers for that course, and what really is appropriate?" he asked.

Joe's idea of "a third customer" was intriguing. He expanded on his thoughts when he said to me:

> I like to think of the instructor as a customer for the student's work. When instructors go into a course they have something to present, they are providing a service. Students in that course are providing feedback to the instructor, so the instructor is a customer for the student's work in that course. How students do papers, how they do exams, how they do homework should be of the highest quality. There's this sort of trade off where the instructor is saying, 'I'm going to give you a quality presentation on material that is deemed to be important by people who know, who are out there, who use this. I expect in return that you give me your highest quality product in terms of the effort you put into exams, papers, homework, labs, this sort of thing.'
>
> Do you as an instructor ever find out about students? Do you ever find out from them what they expect, and what they are getting, and whether this stuff is coming across? So right now, it really is that we [the educators] are demanding quality of our students, without giving them quality from the other end. And that's an interesting interplay, because instructors have always demanded that students give their highest quality work to the instructor, even though the instructor may not be giving his or her highest quality effort in terms of presenting the material.

Maynard's and Rob's Customers

Maynard and Rob agreed with the idea of the student as a customer. "I think my customer is the student. If I do not do a satisfactory job in the eyes of the students, then I'm out of here," Maynard stated emphatically.

One of Rob's students, with several other students nodding their affirmation, said to me, "He calls us his customers. We are his customers, the class and what we want out of it."

Other kinds of customers described by Maynard and Rob were organizations that hire graduates. These potential employers were described by Rob's advisory committee chairperson as "external customers" of the college.

"An excellent way to get the pulse on your external customers," said Chairperson Kevin (a pseudonym), "is to listen to the advisory committee. We in manufacturing, for instance, we expect that the schools provide us with a product, a graduate, whom we can use right away. We really look at the colleges and high schools as suppliers for us."

Listening to the QIPS Advisory Committee, composed of 16 members representing manufacturing firms, service industries, and public schools, is what Rob did. The committee was formed shortly after students began to enroll in the QIPS Program. Rob told me that he went back to the people who helped establish the original program competencies and offered them the "first opportunity" to become advisory committee members because they "were the architects" of the program. After assuring them that they would not be "rubber stamps" for his actions, several agreed to serve.

"So right from the beginning the advisory committee was very active," Rob revealed. "Now we have lots of new members, but they are not here to rubber stamp. This is too important."

When I remarked that the advisory committee sounded like a steering committee, Rob agreed. "They work with us," he said. "I really do appreciate the opportunity to sit down and have discussions in a non-threatening environment where people can speak their minds,

share their rationale, and hear other points of view. Then we make decisions that say this is for the good of the program. This is what's good for students."

Analysis of Attitudes about Customers

The respondents in this study demonstrate that classroom educators who want to apply Deming's ideas to the teaching and learning process can start to do so by first identifying the customers of the instructional process. Deming (1986) writes that everyone involved in a production process is a customer. When education is viewed like Deming's production process, the respondents' attitudes about customers fit into Deming's concepts.

The respondents identify their customers primarily as students. They also consider organizations that hire graduates, professors and instructors of future courses, and other departments, schools, or colleges within postsecondary institutions as customers.

After customers are identified, the respondents reveal that they are willing to listen carefully to those customers. Following that, the respondents are willing to make adjustments to teaching methods and curricula based on customer input.

Roles as Classroom Educators

Respondents viewed students, the instructional process, and their roles as classroom educators in a number of ways. As indicated by the focus group and the persons who responded to the follow-up questionnaire, "a Deming educator promotes continuous improvement" by encouraging students to learn. The respondents in this study were also

willing to share their quality efforts with colleagues and make continuous self-development efforts, other traits identified by the focus group and follow-up questionnaire.

Rob's Views about Classroom Educators

Rob endorsed the idea of teachers as managers and learning facilitators when he talked with me:

> I really think that the job of the teacher as a manager or teacher as a facilitator is to create an environment where the learner begins to choose learning rather than simply being there for that credential, or that shingle, or that credit. But you will find that students will resist that [the teacher as facilitator/manager] at first. They think they want to be told what to do.

Rob explained that when an instructor begins to make changes by becoming a facilitator for the learning process, there may be some initial resistance from students simply because the approach is different. He stated that students, whose educational experiences have been very traditional, will probably not be comfortable immediately with the "new rules."

New rules, Rob asserted, take the emphasis off the instructor as an authority. New rules put greater expectations on students to do, "as Glasser (1992) would say, 'quality work'." Rob stated:

> If you approach the learning process from a standpoint that everybody can learn then you can capitalize on students' normal variation and create a learning environment where each individual can grow. I never cease to be surprised by what the students can do, simply by providing them with information, giving them guidance, answering their questions, and building in some class time for them to work as a group.

Next, Rob talked about how an instructor can begin to create a quality environment. He declared:

> I think that trust is the core. As soon as you start to build that trust, adversarial relationships begin to disappear. It's not us against them, it's we together. If you want to bring Deming into the classroom, you've got to involve the students in those type of activities that before have been only within the realm of what the teacher does.

Rob explained what he does when students just do not understand. "I have to go back and re-examine how I did what I did. I have to sit down with students to come up with a plan to help them comprehend. I'm doing something wrong if they don't get it," Rob said as he soundly rejected the notion that the students were at fault.

Rob believed that persons who want to take Deming's philosophy and principles into their instructional process must have "a knowledge of Deming and the ability to not be afraid of the new paradigms." He had surrounded himself with information, but "the more I get, the more I need," Rob said, as he handed me a list of resources.

Rob began to talk about meetings focusing on quality learning that he and other college staff members had attended at the Center for Accelerated Learning, located in Lake Geneva, Wisconsin. The Center did training primarily for business and industry. Now, Rob said, "when the Center gets inquiries about accelerated learning in an academic environment, they send them to us."

Maynard's Views about Classroom Educators

"Deming spoke of workers, so I approach my students as workers in the knowledge business," Maynard related. "Students' jobs are to learn. I'm a learning facilitator. I'm to create the motivation for students to learn and the mechanism for them to learn."

As he talked, Maynard stepped to the end of the conference table, and drew a triangle on a large pad of paper positioned on an easel. He labeled each corner as he explained that there is a "natural" relationship between managers, teachers, and learners. For success as a manager, one must be a teacher and a learner. "And a teacher has to be both a manager and a learner," he said, as he wrote the words manager, teacher, and learner in the triangle's corners.

Maynard said that he spoke directly to his students about Deming. For instance, he did this when he distributed the course study guide. One of Deming's Fourteen Points is to "eliminate numerical quotas" (Deming, 1986, p.70), so Maynard talked to his students about the length of their research papers. "Your papers need to be quality papers. You can make them as long as you want, as long as the topic is covered," he told them.

"I personally think it's a good idea to talk about Deming, because his name is so much out there in the business world and now in education," Maynard said. "I think it behooves students to at least have some idea of Deming, to hear his name," Maynard concluded.

A student mentioned that she had been motivated by Maynard's emphasis on Deming's work. "I just worked harder especially on research," she remarked.

Maynard had shared his ideas about Deming's concepts with colleagues at the university. About a month prior to our first conversation, he had conducted a workshop for faculty interested in applying Deming's ideas to the instructional process.

Joe's Views about Classroom Educators

Dr. Joe talked about the purpose of education as being one of bringing students to their "fullest potential." In order to do this, Joe asserted, the instructor has to "be prepared to change, to go away from your syllabus, to adjust to the class."

Joe also thought that students should have some expectations about what they want to get out of the course. "Teaching and learning is not just passive spoon-feeding," he said. He talked about "turning the tables" on students. By this he meant asking students to give feedback about what they learned and how well the material was "coming across." He asserted that educators must be open to students' suggestions about instruction and actually "solicit" students' input.

Dr. Joe had presented his ideas to other faculty and staff at the land grant university. He shared his views about customers with his colleagues. In addition, he liked to discuss his participation in a statistics education conference where participants from industry were telling university professors to "teach quality and use some of the techniques of quality to really do the teaching."

Analysis of Roles as Classroom Educators

The respondents assert that the instructional process, as opposed to the students, is managed in concert with Deming's (1986) philosophy and principles. The three respondents do this by becoming facilitators of the learning process. In these roles, the classroom educators place responsibility for learning on their students, while they themselves become managers of the teaching and learning process.

In addition, the respondents willingly share their ideas and experiences about quality with colleagues. The classroom educators are involved in professional self-development activity. Deming (1986) supports professional development when he asserts that continuous improvement requires continuous training and retraining.

Perceptions from Others

Information was gathered from the respondents' students who talked about classroom environments created by the respondents. Input also came from two members of the advisory committee for Rob's technical program, the focus group, the follow-up questionnaire, and through my own observations. The information collected echoed people's thoughts about quality instructors and professors and conferred several leadership attributes upon the classroom educators.

Classroom Environments

People in the focus group and those who responded to the follow-up questionnaire agreed that instructors and professors who apply Deming's philosophy to classroom instruction facilitate students' learning by empowering the learners. They encourage learners to become risk-takers by "leading the learners towards intrinsic satisfaction." Those who apply Deming's philosophy eliminate students' fears about learning and the learning environment. Respondents in this study began to empower their students by creating a serene classroom environment.

Students in Rob's and Maynard's classes revealed their observations about the classroom environments. They described their classrooms as places where educators "allow students freedom" to express themselves. The classroom educators did this in a "relaxed, very casual atmosphere" that was "conducive to learning." One of Rob's students revealed that in some classes soft music was played, "to relieve any tension and just make everyone more comfortable."

"Comfortable" is how students felt with their classmates and with the professor or instructor. They were encouraged to speak out in class, without raising their hands, and to participate openly. Students' "body language" was recognized and acknowledged by the classroom educator.

At the beginning of the semester, Rob facilitated the formation of a buddy system between pairs of students. "If you get all goofed up," a student said, "or if you are absent,

you can get the assignments. Your buddy takes notes, and then you get in contact with each other, so that you won't get behind. It works out pretty good [sic]."

In addition to the buddy system, Rob also organized a telephone tree so that he could relay information easily to students. For instance, this occurred when the campus closed early in the afternoon and class was cancelled. A student related, "Each person is responsible for calling one or two people on the list. Rob has it really well organized and it's really useful."

On the evening I visited Rob's class, I entered the classroom with him. He looked around the room and said, "Oh, my gosh, they reconfigured the furniture!" He explained that he had told the students earlier in the semester that this was their classroom. They were urged to do whatever they wanted to with it as long as they returned it to its original arrangement when the class sessions were finished. "I guess this is the night they've decided to do it," Rob said.

The students had grouped the tables and chairs into four areas. Each area had two rectangular tables pushed together to form one large table. Four, five, or six chairs surrounded each of the enlarged tables. Two smaller tables remained in front of the chalkboard. Rob put the items he was carrying on one small table. After introducing me, he left the classroom so that I could talk with the students.

As the interview with the class of QIPS students progressed, three people described the "ground rules" Rob set up that led to the relaxed learning environment in his classroom. "Ask questions, cheat, and have fun," were the "rules."

Several other students chuckled and nodded their heads in agreement as their classmates talked. The students explained that "cheat" was used to describe students working together in situations they would formerly have worked in alone.

"Traditionally through high school or college, or any other class you might take," said one woman, "you had tests and papers that you were required to do on your own. You didn't look at the person next to you. You didn't copy his work. And you didn't look at what he was doing. You didn't even ask him questions." In Rob's classes, several people revealed, they do all of those "forbidden" things and work together in their learning experiences, i.e., "cheat."

The students and Rob talked about a video that Rob had shown in class: Common Miracles (Guilbault & Paul, 1993). Rob and his students viewed it during one of their first class sessions. One student explained that the video showed the students a new way of learning, that of working together.

Rob described Common Miracles as based on the premise that every student is a gifted student. The producers filmed the video tape in several successful schools. They reviewed Gardner's seven intelligences (Gardner, 1983 & 1993) and talked about the brain and how it works. During the hour of viewing time Rob said that he was both energized and depressed. He was energized because the video "validated" some of the things he tried in his classroom. But it depressed him because the system that his own children were in was not like those shown in the film. When I viewed Common Miracles myself, I discovered that I agreed with Rob's feelings.

Back in Rob's classroom, one woman revealed that she was "scared" about returning to the classroom after a 14-year absence. "But Rob made me feel welcome and comfortable," she said.

Jacob, the advisory committee member who is also a student in the QIPS Program, confirmed the woman's statement. He told me that he had watched Rob "put people at ease" many times. Rob did this not only by talking, but using his various approaches to instruction.

For instance, Rob gave "team tests" Jacob revealed, that were used as "learning tools." Jacob stated that he had never had a team test until he entered the QIPS program. In one of the first sessions Jacob attended, Rob gave the students an "old test." The students discussed the test in small groups and then with the entire class. "Rob wouldn't give us any answers," Jacob disclosed, "so we had this big discussion and I thought, wow, this is learning!"

Jacob's recall of the "testing" incident verified what students in Rob's class had told me about fear in the classroom. When I made reference to Deming's writing about "driving out fear" (Deming, 1986, p. 59), I asked them what Rob did to drive out fear. The instant, emphatic answer was, "There is no fear in this classroom! Each of us has a place here. We contribute and we learn from each other."

Reducing students fears in the classroom was also one of Maynard's major objectives. "Fear is always going to be present," he said. "Fear is what keeps us standing up straight.

It creates some tension. But it's reducing the unnecessary and harmful fear that's important." That unnecessary fear was the kind that Maynard addressed.

Maynard made specific efforts to reduce students' fears in his classroom. Besides speaking to students about Deming's eighth point, he made eliminating fear his personal objective in the teaching and learning process. Maynard's shared lesson plan format, used in his syllabi and study guides, his willingness to treat students as equals, and his role as a "learning facilitator" all contributed to eliminating students' fears about learning and the learning environment.

Leadership Attributes

People described the respondents with a variety of attributes. Most of the expressions used fit into Deming's concept of a leader. Terms such as a peer, an evaluator, a flexible teacher, a listener, and a resource person were among those used in the descriptions about the classroom educators.

A Peer

Students characterized Maynard by saying, "Dr. M. does a very good job of treating all of us as peers. There are very few barriers between us and him. I think most of us feel very comfortable being up front with him. We are consistently treated as professionals and our opinions are valued. I don't get a sense that he is ever talking down to us."

"Also," revealed another graduate student, "you can't lead without leaving yourself a little bit vulnerable or open. Dr. M. is willing to let us in. He's just a decent human being who values other folks."

Another student talked about Maynard's method of "building trust" as being relatively simple. "He makes sure that he is what he says, that he is very consistent. His actions fit his words," she said.

Rob's students also regarded him as a peer. They talked about how he helped them build confidence by facilitating group work. In the groups students had the chance to share their ideas and experiences with others. "We learn that way," related one young woman. "And Rob keeps the focus on the problems, not on the people," another reported.

An Evaluator

People in the focus group and the people who responded to the questionnaire based on the focus group's ideas stressed classroom educators' willingness to be evaluated by others as an important characteristic of a Deming instructor. Although some persons who responded to the questionnaire expressed disagreement with the idea of imposed evaluation because Deming resisted it, all agreed that an educator who follows Deming's philosophy is seriously involved in assessment of his or her own classroom effectiveness.

The data collected indicated that all three classroom educators used self-assessment strategies. A student related that Rob "used a balance sheet to evaluate himself," asking students for input about "what is good and what should be changed." Joe and Maynard

furnished samples of student surveys they had used for self-assessment purposes. These can be found in Appendix F and Appendix G.

A Flexible Teacher

The three respondents all demonstrated flexibility. A good example of flexibility occurred in Dr. Joe's class. He asked the students to do a minute paper during the previous class period. A minute paper is a technique described by Angelo and Cross (1993) to get rapid student feedback. Although Joe said as the class session began, "I'll spend 15 minutes or so responding to some of the feedback you gave me on the questionnaire Friday," he spent more than half of the 50 minute class period talking about the two topics the students indicated on their minute papers they did not understand. My observation confirmed earlier statements Joe made about how he responded to students' needs by getting away from the syllabus to make necessary changes.

In Rob's class students talked about his willingness to work with students who were unable to attend class because of business obligations. They reported that Rob went out of his way to meet those individuals at alternate times. Within the classroom itself he was "very open-minded" and had no problems setting aside time and adjusting the class agenda to meet the students' needs, several people reported.

Jacob, the advisory committee member who was also a student in the QIPS program, talked about the issue of classroom control when I asked about Rob's flexibility. "Rob would give you [the student] control if he thought you would learn from it," Jacob stated

emphatically. "He'd say, 'Here, go for it.' When you get into quality processes, you have got to share the control, because the more people who share, the better it gets."

Later when Rob discussed control, he talked about his first teaching experience. He described himself as an instructor with a "traditional style. I pretty much guided the learning, I determined what the activities were," he said.

Rob soon began feeling uncomfortable and sensed that the students were dissatisfied, too. When the students expressed their discomfort he declared:

> It was the greatest thing that ever happened! We began the process of negotiation, and all of a sudden there was a whole different perspective of what the course was supposed to do, and how and why it was going to do it. While I didn't lose control, the students were able to assume some control. And so, I became more of a guide, and they became more directly involved in what it was they wanted to learn and how they wanted to learn about it.

Maynard was "much more flexible than he once was," a graduate student said. His teaching style, the student revealed, had changed "dramatically" since Maynard first arrived at the university.

As a further explanation of flexible, the student related that Maynard had initially been very rigid in his expectations of "graduate work." Maynard pulled students aside and suggested that they drop the course if they couldn't adjust their lives to put forth "more and better effort." The student continued:

> Dr. M. still adheres to the requirements placed by the Department, but now facilitates discussions and has students brainstorm their own needs relative to the program. He is totally a different individual in this respect than he was three years ago. Deming saved this man!

Students talked specifically about Dr. M. and the department. They thought that Maynard was "struggling within the department" because people who taught the same courses challenged him and asked him to justify that each of the students he passed had met the departmental objectives. Other department members were aware of Maynard's "evolution to Deming's principles," and didn't agree with him, one student ventured.

"Does the departmental system need to be fixed?" I asked Maynard's students. "Yes! I think anybody trying to operate within it cannot apply Deming's theories because of the constraints of the system," one student replied. "Does that make sense to anybody else?" A chorus of affirmations followed from the other class members.

Other students talked about Maynard's flexibility despite the departmental regulations. They revealed that he pushed back deadlines to accommodate them so that they were no longer "absolutely inundated." Maynard took this action and others like it after he listened to the students' concerns.

A Listener

Many people described the respondents as good listeners. Students from each of the respondents' classes affirmed that Joe, Maynard, and Rob were all good listeners. Not only did the classroom educators listen, the students revealed, but they responded to the students' concerns.

Jacob, the teacher on Rob's advisory committee, talked about an expanded role Rob had taken as a result of listening to Jacob's apprehensions. "Actually," Jacob said, "Rob has

been a kind of invisible facilitator for our high school. People there haven't ever seen Rob, but I bring a lot of things from there to him."

Jacob went on to explain that while his school was trying to construct and implement a plan through quality improvement team action, he would "bounce plans off" Rob. Jacob credited Rob with helping build the school's quality improvement team and the Quality Studies course.

A Resource Person

"A resource person" was Jacob's description of Rob as he talked about all the books and other materials he had borrowed from the technical college instructor. "When you need help, he is always available," Jacob continued.

Kevin, the other committee member, echoed Jacob's thoughts about Rob. He described Rob as a "facilitator" for the advisory committee. "He's really the knowledge center of the committee. He lets us know what is going on, what's happening, what the recommendations are. As far as knowledge and background, Rob's fantastic," Kevin concluded.

Analysis of Perceptions from Others

Psychology is an important component of Deming's (1993) theory of profound knowledge. The respondents address Deming's psychology by establishing a classroom environment comfortable for students and by beginning to eliminate students' residual fears

about learning in the educational system. They encourage students to develop confidence and self-esteem by providing an environment that encourages risk-taking and sharing of information.

The respondents in this study assume leadership roles in their classrooms. They reveal leadership characteristics described by Deming. Although evaluator is not a term Deming embraces, if it is defined in reference to self-assessment, then it, too, fits into Deming's view of leadership. Deming stresses the importance of leadership in establishment of a quality system. A leader, Deming writes, "creates trust, listens and learns without passing judgment on him that he listens to, does not expect perfection, and understands the benefits of cooperation and the losses from competition between people and between groups," (1989, p. 27). Thus, the attributes given to the respondents by others fit into Deming's definition of a leader.

The Instructional Process

In this section of the chapter, the teaching and learning process used by the respondents is described. The respondents' preparations for instruction are reported first.

Next, the second step of the respondents' instructional process, involving students in learning, is described.

The third part of the teaching and learning process used by the respondents is collecting feedback from students. In addressing student feedback, the focus is on the respondents' efforts to get timely, accurate information from students.

Descriptions of the respondents' strategies and techniques for assessing students' progress are addressed in the concluding portion of this section.

Connections between the respondents' practices and Deming's philosophy and principles are established under each of the four section subheadings: Preparation for Instruction, Involving Students in Learning, Collecting Feedback from Students, and Assessing Students' Progress.

Preparation for Instruction

Preparation was something Joe, Maynard, and Rob did before they began to teach classes. Although there was similarity in their preparations, all had distinctive materials that they wrote for students. After their courses started, they involved students in initial planning about the delivery of the courses. Giving students decision-making responsibilities about class activities was one method of involving them in course planning processes.

Maynard's Planning Process

Maynard, who taught his classes on either a weekend or a once a week meeting schedule, usually in an off-campus site, prepared a syllabus and an accompanying study guide with what he called a "shared lesson plan format." He mailed the syllabus to the students about a month before the first class meeting. The study guides were correlated with the students' textbooks.

Maynard gave me copies of syllabi and study guides, i.e., "shared lesson plans," from three courses he had taught. He described the syllabi as "kind of the basic curriculum design of the 70's." The syllabi listed information about the courses, as well as basic details about Maynard's office hours, mailing address, office and home telephone numbers, course prerequisites, required texts, and a bibliography of source documents. Two of the syllabi were eight pages in length; the third one was eleven pages long. All were printed on 17" by 11" paper, folded and stapled in the center to make a book-like document.

Each syllabus listed the course objectives. There were two sections of objectives on the syllabus. The first list of objectives was designated as the responsibility of the course; the second set of objectives said that the "course contributes to the objectives for Leadership Candidates ("LC")," i. e., the students. The objectives came from a departmental matrix of course outcomes. Each objective was referenced to the departmental list. One of Maynard's syllabi is illustrated in Appendix H.

"The course syllabus has a lot of information on what we are about. This particular format I've been using for the past year," Maynard said, as I examined very detailed descriptions of the course requirements. "I don't recycle the same syllabus. I change it. I'm looking for the perfect syllabus and it is an evolving process of continuous improvement," he continued, as I thought that these were the most descriptive course syllabi I had ever seen!

Study guides for two of the courses were also very detailed. On the introductory page of the journal/study guide for a school finance course, Maynard wrote about his study

guide's purpose--to assist the students in determining what "focus points" were important. "It would be nice if you and I could sit together--one-to-one--and discuss these focus points," Maynard wrote on the study guide, "yet your priorities and your other time commitments do not permit such a one-to-one discussion." A portion of the text study guide is included as Appendix I.

As students worked through the guide, they were asked to respond to a series of questions about information they read in the textbook. Maynard included specific page and paragraph references, as well as his own comments about the topics. Many of those comments referenced Deming's ideas.

Space for the student's response was provided between items in the study guide, which had to be submitted to Maynard as part of the requirements for the course. Sometimes Maynard included footnotes suggesting topics that might be appropriate for research projects. He called them "little asides, to borrow a Shakespearian term. I make a little commentary and there's no work expected of students," he said.

When Maynard used his first study guide, he feared that the guide would be seen as "spoon feeding" by the students, but discovered that students did not respond that way. "Deming taught that people have a natural desire to learn," Maynard asserted. "I find that graduate students have a natural desire to learn, but they have competition for their time. So, the class keeps on target. We keep on task."

Maynard related that the shared lesson plan format worked with other classes, and cited his wife's experience with a Sunday School class of junior high students who were

using the same model. "So specifying the objectives and tasks and what we are all about is not only good for graduate students," he said, "it's good for 10-year olds and 12-year olds, and probably good for anybody else, too."

Students in Maynard's curriculum planning course voiced their thoughts about the syllabi and study guides. One woman said:

> Even though we have to meet the criteria of taking the department mandated evaluations, tests, Dr. M. provides us with study guides for all of the readings. The tests or evaluations are taken from those study guides and you know that, so you are not frantically searching through the text trying to figure out what will be on the test.

One graduate student in Maynard's class talked about her job as a teacher. She related that she had begun to use study guides with sixth graders. The guides, modeled after Maynard's study guides, were designed to "reduce students' fears" about important science concepts, she said.

Maynard determined the study guides' effectiveness by using an evaluation. A copy of the study guide evaluation for the textbook used during the previous semester and the students' responses are in Appendix J.

Rob's Planning Process

Rob prepared written materials similar to Maynard's for students in his classes. Because the entire associate degree program focused on training students in quality process skills for problem solving, planning, and continuous improvement, the curriculum was designed to the specifications of business and industry representatives who employed

program graduates. Before the program began in 1991, these representatives participated in a process, known as DACUM, Developing A CUrriculuM (Finch & Crunkilton, 1979), to establish the competencies that program graduates should possess.

Materials for students in Rob's courses listed the competencies in much the same manner as Maynard's departmental requirements. For instance, from the course called Process Improvement, a list entitled "DACUM COMPETENCIES" referenced the course topics to the numbered DACUM competencies. That list is included as Appendix K.

In addition to the list of DACUM competencies related to the specific course, Rob also distributed to his students a syllabus which included his telephone number and his availability, as well as a bibliography of sources, required texts, a course description, attendance policy, and a timeline of course topics. The course syllabus for Quality as an Organizational Strategy is shown in Appendix L.

The technical college's course data file contained even more specific information about the content of each course. Although students did not normally receive this, it was made available to them on request. A course competency list, an outline, and performance objectives were included in the file. The course data file for Process Improvement is included as Appendix M.

As we talked, Rob explained:

> Some things that sounded good before the program began, we now realize were ill advised. For instance, in our DACUM study we had this area of computer applications and we built a course and said, 'Let's teach all the computer applications in one course.' What a silly idea, looking at it now! So we just went through one of our program changes here to delete that computer applications course. The

> competencies will be integrated into various courses. And then, also as a result of that deletion, we built in some basic computer courses in the technical support area.

Rob went on to reveal that, although the competencies remained as designated by the DACUM study, the curriculum was "very flexible" because the program was still new. With input from the program advisory committee, the curriculum had already changed three times.

Rob invited speakers to class during the first semester and his students "called" him on the practice. So he gave students responsibility for selecting and inviting people to talk with the class. Rob guided the process by initiating discussions about the "concept" of guest presenters and what the students wanted to learn from their speakers. He told me:

> I had a flip chart page that I hung on the wall. It had a header on it that said, 'Guest Presenters'. The students took a post-it note and wrote a person's name on it at any time and stuck it up on the chart. Once we had a pool, we as a group, determined who we were going to invite to speak.

The students determined next what kinds of "requirements" they would have for the speakers. Determining the requirements took "several iterations," Rob related. "It's my job," he said, "to promote critical thinking skills, provide impetus, and give a little bit of guidance" to the speaker selection process.

Rob's students invited the selected speakers and asked them if they were "comfortable" with the requirements. "We've not had anyone turn us down," Rob said. "Some of the guest presenters were astounded at the depth of the requirements, a one-page outline with a follow-up page of questions."

Joe's Planning Process

Joe distributed a syllabus for the 400 level statistics course during a class session I attended. It included information about how students could contact him, as well as a "Tentative Outline" and timetable of the course topics for the semester. The evaluation guidelines were also included. Joe attached a questionnaire for each student to complete during the first class meeting. The questionnaire is in Appendix F. It is one Angelo and Cross (1993) call a Background Knowledge Probe, an initial assessment of a student's experiences relevant to the course.

Joe talked about his experiences during the last few years in "trying to do more with involving the students and looking at the student as the customer for presentation." The questionnaire was just the beginning of his endeavors to get feedback from his student customers.

Dr. Joe gave students choices about assigned homework. During the first class session of the semester, he asked them to determine which of two options they preferred--"free floating" homework assigned at the end of chapters or topics and due one week from the date of the assignment, or a second "more regimented" option with homework due every Friday. Students had a few minutes to discuss the two options. Then they selected the "free-floating" option.

Joe did much the same with another issue. He told the class they had another decision to make, this one concerning use of either a formula sheet or an open book/open note policy for the exams. After Joe answered several questions, a student suggested that

they wait until they were a little closer to the time of the first exam. Joe agreed to delay the decision.

Analysis of Preparation for Instruction

The respondents are able to "break down barriers" (Deming, 1986, p. 62) with their students in the early phases of the instructional process. They prepare materials for their students that clearly define the course goals and objectives. These are shared with students at the beginning of each course as the classroom educators attempt to assure that all involved in the instructional process understand what the goals and objectives are. Clearly specified goals, understood by all involved in a process, is one of Deming's principles (Deming, 1993).

The curriculum design process, specifically the DACUM process used in Rob's program, is based on customer input. Deming emphasizes that all customers of a process be identified and consulted. The QIPS program curriculum is outlined in detail by people who are employed in the quality field. Its competencies, established by the DACUM committee, are the objectives students must meet before they can graduate from the program.

The respondents assume classroom leadership by developing and maintaining customer focused instruction and by setting expectations with students. As the instructional process continues, the respondents involve students in the planning and execution of learning activities.

Involving Students in Learning

Besides creating an environment conducive to learning and including students in initial planning of class activities, one of the most prominent strategies demonstrated by the respondents was to actively involve students in learning activities. The three classroom educators used a variety of techniques to activate their strategy of involving students in the learning process. Rob began by administering a learning styles inventory. Dr. Joe offered students a guarantee. Rob, Joe, and Maynard all used student teams to facilitate learning.

Learning Styles

The focus group specified and the people who responded to the follow-up questionnaire agreed that classroom educators who apply Deming's philosophy to the teaching and learning process should "use diagnostic tools to discover students' learning strengths and weaknesses."

Rob was interested in knowing about his students and their preferences for learning. He revealed that he was familiar with Kolb's Learning Style Inventory (1981) and the Myers Briggs Type Inventory (1987). He had chosen to use the latter with his students.

In one of the first QIPS program courses--Organizations, Paradigms, and Change--Rob gave students the Myers Briggs Type Inventory (MBTI). The course was designed to acquaint students with "three tiers" of organizations: individuals, groups within organizations, and organizations as a whole. Rob stated:

> We have to have some information about us as individuals if we want to look at people within organizations. We need to know how people interact with other people in groups. When we think in terms of change within an organization, we need some knowledge.

Rob selected the MBTI for assessing students' learning preferences. He was trained in the administration and interpretation of the MBTI. The inventory indicated learning preferences in four areas, and then created 16 different MBTI types. Rob used the book Gifts Differing, written by Isabelle Briggs Myers, for detailed information about "the way people prefer to use their minds, specifically the way they perceive and the way they make judgments" (Myers, 1990, p. 1). The book outlined characteristics of all 16 MBTI types.

Rob's students placed themselves as one of the 16 MBTI types before they saw the results of the inventory. Rob explained:

> That is by design because that is the way the process of debriefing is supposed to work. Sometimes students agree with the results, and sometimes they disagree. I try to make them understand that the final type determination is really made by each individual. I don't say, 'No, the instrument said this, so this is what you are.' Students should make their own determination and be comfortable with it.

Although some people had "a difficult time indicating their preferences," individuals identified their own learning styles based on information they got from the MBTI. Rob didn't require that students share their MBTI information with anyone, although students often were anxious to discuss their preferences. Rob said:

> The MBTI is something people can take with them, a little bit of self-knowledge, and the understanding that somebody else sees the world differently than they do. It's okay for people to see things differently, take in information in different ways, get their energy in different ways.

Rob collected information about each student's MBTI type for himself, however. He used it to assist in structuring groups for team activities. When he did this he tried to get a blend of types in each group. He described the grouping process to me:

> I don't tell the students what I am doing. They will typically come back to me and share some things about the experience, perhaps about individuals within the group and how they worked. We can go back afterwards and talk about some of what they experienced and what they thought was behind it. Then we talk about different learning styles and how they materialize in teamwork.

Guarantees

Dr. Joe gave students in his classes a guarantee. When he talked to students about the guarantee he said:

> If I make a content mistake during my presentation on the blackboard like a problem, a calculation error, or interpretation, or something like that, and you catch it, just raise your hand. If it's a mistake, I will give you either one dollar, cash, right there, or everyone who's in the class that day can earn an extra credit point on the next exam.

Joe explained his guarantee further. On each exam he left a blank space for students to complete with information they had recorded on their formula sheets. That information included the mistakes Dr. Joe had made and the dates when he made them. "So people who are attending class know how many points there are and can put that down for extra credit. Then they start thinking!" he said, as he reported that, to date, he had given out only three points and two dollars.

"Ultimately it would be great to give a guarantee at the beginning of the course that says if you are not satisfied at the end, if you are not completely satisfied, then you can, at

no cost to you, repeat the course," Joe stated. "I think there will be colleges out there that will be doing that pretty soon."

Teamwork

The focus group and responses on the follow-up questionnaire indicated that learning should be "related to real-life situations." The focus group and most people who returned the questionnaire agreed that a Deming professor uses "team learning approaches" to simulate real-life situations.

All three classroom educators formed student teams as part of the instructional process. Dr. Joe talked about teams of students formed to work outside the classroom and as quality teams. Maynard revealed his use of study teams, teams to critique papers, and teams to discuss issues. Teams in Rob's classroom collected data, wrote standard operating procedures, and taught each other.

"Real World" Project Teams

Dr. Joe believed that students should get some experience working in teams while still at the university. "Customers of the content" were telling him that they wanted to hire people with some experience in group processes.

When I entered Joe's classroom, I understood why establishing teams to work outside the classroom on a group project was a logical decision. Dr. Joe's classroom was not conducive to small group activity. It contained nearly 50 immovable desk chairs, six or

seven chairs bolted to the floor in eight parallel rows. The chairs faced a chalkboard which covered the south wall adjacent to the entrance on the southeast corner. There were two large windows, covered by closed draperies on the north and west walls. Students sat towards the front. No one was in the chairs at the back of the room. I silently applauded when Joe entered the classroom and opened the draperies before removing his coat!

Joe explained to the students that the team projects were "something like a contest." Before making the project assignment, however, he made sure, via a survey, that students were comfortable with using the networked computer system.

For the project Joe put data in the computer. Each team had to design an experiment and collect data. Joe generated responses with errors and teams responded. The teams had budgets and were limited in obtaining information by the computer data. Joe's purpose, he explained to the students, was to simulate a "real world" research experiment.

Students expressed apprehensions about the team project because they were concerned that everyone on the team would not do an equal amount of work. Joe responded by acknowledging their fears. He reinforced the fact that the project reflected a "real world" work team activity by saying, "That's exactly what you're going to find out when you go to work."

Joe felt that students should be actively involved in their own learning. He asserted that teamwork facilitates the learning process. Important side benefits for students included meeting other people and working on "other things" with them, he said.

Quality Teams

Joe talked about an acquaintance in another university who had successfully incorporated teamwork into classes of several hundred students. He explained that the professor, who taught statistical methods for business students, formed a corporation with himself as Chief Executive Officer (CEO) and the students as employees. He emphasized the all-one-team concept and commitment to quality-based decision-making. The professor had a quality improvement team work with him to improve the quality of the course during the semester.

With more than 300 students, the professor picked a team of six people by having students apply for the jobs. Students submitted a resume and a letter of recommendation. The professor conducted interviews and selected the six people he thought could do the best job. The improvement team was responsible for administering questionnaires and minute papers, taking a lot of the work away from the professor/CEO. Joe related that his colleague was in a college of business where the strategy worked well. "I think you have to adapt to your own environment," Joe said. "Business students would relate to this, education students might not."

Study Teams

Maynard spoke about a time, earlier in his career, when he was assigned to teach an accounting class in a business college. He didn't know anything about accounting so decided

to become "a learning facilitator" for the students. He paired the students and told them their task was to do a minimum of one textbook chapter per week with their study partner. They took tests when they were ready. "They had higher grades on the standardized textbook tests at the end of the course than any class had ever had in Accounting I. We covered all the material and I didn't know anything about accounting," Maynard related.

Discussion Teams

Teams of students were discussing curriculum issues related to their subject-matter areas of expertise when I observed Maynard's class. Gathered in groups of three, four, or five, the students, under Maynard's direction, talked about specific topics assigned by him.

The classroom was in the university's off-campus facility located on a private college campus in a metropolitan area about 80 miles from the university. Although I felt as if I had negotiated a maze to get to the room, because the hallway took at least half a dozen twists and turns, the classroom itself was fairly ordinary. Rectangular tables, with chairs placed on one side only, faced the chalkboard. Between the board and the student tables was a single narrow table with a small wooden podium centered on it. The two side walls were obviously movable, indicating that the room had multiple uses.

When the students began their team activity, they formed into groups by moving their chairs completely around individual tables. No one appeared reluctant to talk either during the discussion within the groups, or later with the entire class. Although time ran out before

all of the teams reported back to the class about their discussions, Maynard promised to start the next class session with the remainder of the team reports.

Critiquing Teams

Maynard discussed an activity, recommended to him by a colleague who used it in teaching undergraduate composition courses, that he tried in one of his classes. As specified by Maynard's department, students were required to write a research paper.

During the first class weekend, Maynard divided the students into pairs to write the characteristics of an A paper. He consolidated their work and wrote the characteristics on the board the next day. "Those then became the specifications for an A paper," he stated.

Maynard asked the students to bring a "good draft" of their paper to the second weekend class. The only identifications on the papers were the last four digits of students' social security numbers. Maynard paired the students, gave them the A paper specifications, and distributed the drafts for critiquing.

The next day he passed the drafts back. "There were some students who were very pleased that their names were not on the papers," he related. "I did that to reduce fear. But it was terrible! The critiquing activity created a lot of fear."

Maynard knew that his colleagues' undergraduates responded positively to the paper-critiquing technique. Many of Maynard's students did not. The reason, Maynard stated, was illustrated by reviewing characteristics of adult learners. Reading from an unknown source, he said, "Adult students are dedicated, enthusiastic, want to please, want to do well,

but often lack self-confidence. They want on-task activities. They have high test-anxiety and they have a high demand for structure."

Rather than abandoning the idea of critiquing papers, Maynard changed his strategy for the next class. Students generated A paper characteristics and then brought their drafts into class for their peers to critique. The people reviewing them were instructed to write three good comments about the paper. "We're not into criticism, we're into learning something," Maynard stated.

A student, who had been enrolled in both of the classes, revealed, without my asking, what had happened. She said:

> In that first class Dr. M. asked us to exchange papers and have other students read them. That ended up being a real fear situation for some people. I think many people were shocked at some of the commentary that was on those papers. So this time, in this class, and this goes with Deming's point about constantly improving your teaching methods, Dr. M. still had us do papers and rough drafts and exchange them. But one of the things he said this time was, 'Make three positive comments about this paper' as opposed to criticism about the paper. I think that helped to drive out some fears people had.

Data-Gathering Teams

Teamwork was immediately evident in Rob's classroom. Rob previously described his role in teamwork activities as that of a "gopher. If the teams need stuff, I get it. If they need copies, I make them. If they need videos, I get them. That's my role. I become a runner for the groups and between the groups," Rob said.

Rob and his assistant Emily (a pseudonym) were both "gophers" the evening I was present in the classroom. They made a contrasting pair. Dressed in blue slacks and a white

sweater adorned by a single heavy gold chain, Emily was thin, about 110 pounds, and approximately five feet, five inches tall. She had blond page-boy length hair and wire-rimmed glasses, and her facial features were pointed. She also smiled frequently, and when she spoke her voice carried easily across the room.

Two teamwork assignments took place. For the first activity, two groups remained in the classroom, but two others went to adjoining classrooms to work. Rob and Emily moved from one room to another.

The students in each team charted their groups' "production" efforts. Rob and Emily gave each team six sets of five small objects: buttons, screws, washers, etc.; a piece of white paper about four feet square; a colored marker; a tape measure, and some masking tape. Instructions were to construct a target in the center of the paper and then, from a distance of ten feet, throw the objects at the target. After collecting all the information about their attempts to hit the target, each group created six quality tools using their data: a checksheet, a run chart, a scatter diagram, a histogram, a Pareto chart, and a cause and effect diagram.

Although I stayed in the classroom and observed only two of the four teams at work on the project, it was quickly apparent that the groups' approaches to the assignment were different. One group drew a single circle on their paper, representing the target, while the other group sketched a set of several concentric rings.

When the groups finished their activities, they all came back into the classroom. Rob and Emily asked them questions about what they had done.

There was continuous verbal interaction between Rob, Emily, and the students, accompanied by frequent laughter. The groups revealed that they had created various guidelines, which differed from team to team. All had used the directions Rob gave them at the beginning of the exercise. One group wanted to use the tape, sticky side up, so that the objects wouldn't bounce so much. Another group wanted to put another target on the wall and bank the objects off of it. Rob ruled out both of these ideas.

Rob noted that there was "no real consistency" in the measurements taken during the activity. He mentioned that the students who drew the concentric circles were "real innovative. They wanted to build in all kinds of improvements. And they built zones of measurement, rather than measuring each toss separately." He continued to lead the discussion with such comments as "What did you Pareto? Tell me about it. Got it!"

When Rob mentioned that there was a lot of variation in the data collected by the teams, he used an illustration for normal variation that caught my attention:

> If there was no variation in popcorn, for instance, I could throw all my popcorn kernels in the popcorn popper, and wham, I could have a bowl of popcorn all popped at once. But, no, it starts out slow, builds to a crescendo, and then slows to a few pops at the end. It sounds like a bell curve, the way popcorn pops.

A discussion of normal variation followed as a lead-in to the next team activity.

Procedure-Writing Teams

The next team project was an exercise Rob called PB & J. The four teams were to write a standard operating procedure (SOP) for making a peanut butter and jelly sandwich!

Although Rob presented no rationale to the students for the assignment, he told them to have fun doing it.

After the student teams completed their task, Rob and his assistant, Emily, reviewed the procedures from each group. When they finished, Rob said to one woman, "Hannah, (not her real name) I need a volunteer." As Hannah came forward, Rob reached into the paper bag he had brought into the room at the beginning of the class period, pulled out a loaf of bread, several knives, some spoons, a jar of peanut butter, a jar of jelly, napkins, and paper plates. He put them on the front table.

"Now," he said to Hannah, "I'll read your team's procedure, and you will follow it without wavering." This comment brought a barrage of laughter from the students.

"Hold loaf of bread in left hand and remove twistie," Rob read. "What's a twistie, Hannah?"

There were several comments from Hannah and her team such as "That's the wrong kind of bread," and "You didn't show us the material first."

"Grab jar of peanut butter with left hand," Rob read. "But you haven't put the loaf down!" Laughter erupted again from the class. "Another deviation from the procedure," Rob chuckled.

The exercise proceeded with Rob reading and Hannah following directions until its conclusion. Errors, deviations, and omissions were noted. The laughter continued throughout.

"Now you've had a chance to see variations in the PB & J operating procedure," Rob said. "So there was a purpose to this experiment. What did we learn by following the operating procedures? Why do we have them?"

Students responded with replies: "Not enough detail. Assumptions were made. Things weren't spelled out. This was fun to watch!"

"Several lessons should be learned from the exercise," Rob explained. "We have this concept that everything should be the same. But you know in the real world everything is not. There are communication barriers inherent in written procedures and variation is real." He continued by placing emphasis on the importance of checking with the people who are actually required to perform the standard operation procedure while the procedure is being written.

Three students in Rob's class related the PB & J exercise directly to their work. One talked about his experience writing procedures to meet federal standards. Two other students revealed that they wrote standard operating procedures (SOP's) as a regular part of their jobs.

"I tested my SOP's with other people," one of the three students stated. "I wrote the first procedure at least eight times. Proof it, test it, don't assume it's perfect the first time around. Be flexible. Learn from it," she summarized.

"Teach to Learn" Teams

Rob involved students in what he labeled "Teach to Learn" activities. In one of the telephone interviews, he said:

> You know, I had class last night. My students did Teach to Learn activities. We did habit number five from Covey's Seven Habits. After my introduction and review from the previous week, I turned the class over to a student team. We had a wonderful time.
>
> The fifth habit is 'Seek first to understand, then be understood.' The whole purpose and message behind that habit is that when we listen, we need to turn off everything that is going on inside. We can't listen autobiographically, we have to listen empathically. So the students designed some experiences for us to help us understand what it means to listen empathically.

The students used two activities to stress Covey's fifth habit. First they distributed wax lips, purchased from a local candy store, to everyone. The lips served as a reminder that to really understand someone, you had to listen.

The purpose of the second activity was to illustrate the importance of non-verbal communication. The team showed their classmates a video segment, without sound, from an old movie. Students were instructed to "hear the emotions with their eyes," Rob related. After viewing the segment, the team showed the video again with sound, "to validate the emotions we had seen," Rob concluded.

Students expressed concerns about the Teach to Learn exercises when Rob introduced the concept at the beginning of the term. He related that the students asked questions like: "What if our teaching skills, and those of our group, are not that great? What if we miss something? How are we going to get that? How are you going to distinguish between groups and skill levels?"

Rob responded to their questions by assuring them that he realized that "everybody has a different skill level." He told students he wanted each of them to make progress from "where you are" and that "you will be learning." He also told them that he would "augment" their Teach to Learn activities when time allowed.

Rob revealed that he prepared his own activities for the previous evening's class. One of those he used. He selected four controversial articles from Educational Leadership, divided the class into four groups, and instructed them to read and discuss the article assigned to their team. Then each group had to present their article to the rest of the class "without emotion." The point of the activity, Rob said, was to:

> ....get students engaged and then augment what the team had done. It was just another way of driving the point home, bringing them back to Covey's fifth habit--Seek first to understand. This is a habit that ties very firmly with the previous habit--the win-win habit--and which will tie very closely with the habit for next week which is synergy. So I augmented what the students did last night in their Teach to Learn activity.

Students in Rob's class liked the Teach to Learn projects. One woman expressed her pleasure quite succinctly when she said, "It's good. Instead of listening to Rob all the time, you're listening to other people present information, and presenting yourself. It's a great learning process."

Many of Rob's students took what they learned in his classes and applied it to their jobs. Jacob, the advisory committee member, teacher working on his masters degree, and student in the QIPS program, said, "Every time I took a class from Rob, I brought tons and

tons of things into my classroom. I'd learn something and steal his methods. It sounds kind of sappy," Jacob concluded, "but quality thinking has changed my life."

Other students in Rob's class talked about how studying in the QIPS program affected their working lives. "It's hard for our management people to understand a lot of what we are learning in Rob's classes," remarked one male student. "We try and get our bosses to understand what we have learned, but it is not easy. Trying to change what people have done for years is very frustrating."

"I have the ability now," said another student, "to look at problems in a little bit different light. I'm more broad-minded, more open-minded. I look at the problem in and of itself instead of looking at the people who are involved in it," she remarked.

Still another student joined the discussion. "I have tried to suggest more solutions to problems that I see instead of just grumbling about them. Some have worked, and some haven't. At least I've tried. It made me feel better about what I am doing," she commented.

Another man in the class summarized:

> I think I can look at the process that is going on and recognize the politics in the workplace. I read through the textbook and say to myself, 'Boy, this is reality!' It is. Sometimes I can change reality and sometimes I just have to live with it."

Analysis of Involving Students in Learning

Deming writes about the importance of recognizing differences in the ways people learn. Rob's use of the Myers-Briggs Type Inventory ties directly to Deming's statements

about how managers should recognize these differences and "use them for optimization of everybody's abilities and inclinations" (Deming, 1993, p. 111).

Although some major American companies have adopted a guarantee of quality service, Deming does not directly address this issue. If the guarantee is an indication of a quality process at work, as it was intended by respondent Joe, then its use adheres to Deming's ideas.

Part of Deming's "new philosophy" (1986, p. 26) is to encourage workers to collaborate to solve problems. This, Deming writes, can best be accomplished through teamwork to "remove barriers" (1986, p. 62).

All the respondents incorporate student teams into their instructional processes. Through teamwork, students are able to experience Deming's philosophy at work in their classrooms. Teamwork facilitates the removal of barriers between classroom educators and students, also. It allows the educators to assume roles as leaders rather than authority figures.

Collecting Feedback from Students

Responses to the follow-up questionnaire, based on the input of the focus group, indicated that a Deming classroom educator should be able to "continuously monitor the learning process by collecting and analyzing data." In addition, the educator should "assess customer expectations and satisfactions, use a variety of quality tools to measure the quality of teaching and learning, provide frequent feedback, and use data for improvement of

teaching methods and curriculum." The respondents used minute papers, Pareto charts, a force field analysis, and a general survey as they gathered student feedback.

Joe's Minute Papers

Dr. Joe utilized a lecture format for most of his classes. He collected data about the lectures regularly from his students. Besides doing a Background Knowledge Probe, Joe conducted several surveys during the term.

Joe asserted that there should be a process in place in the classroom for systematically collecting information, giving feedback, and acting on suggestions of student customers. "Most instructors get feedback at the end of the semester. But that's much too late. Deming says you don't inspect at the end, which is what those end of semester evaluations are," Joe said. Joe gave his students surveys or "minute papers" regularly during the semester.

During the second week, Joe asked some questions on a minute paper about the use of the chalkboard. His class was in a room where the chalkboard was very small and he wrote on the board "a lot." When the students' answers were compiled, almost 20% of them said the chalkboard was "too low."

When Joe asked his students to explain what "too low" meant, people in the back of the lecture hall raised their hands and said, "When you write on the board we can't see because it's down too far." After that Joe drew a line about a foot off the base of the chalkboard before he started his lecture. He did not write below that line. "The thing is," he revealed, "that if I hadn't asked the question, I could have gone through the entire

semester, and maybe several semesters, in this room without realizing that some people were only seeing 75% of what I put on the board."

Six weeks into the semester Joe gave the students a minute paper he described as "more ambitious." He created a questionnaire for the students which contained several questions and a five point evaluation scale. He described the questionnaire as a "combination of an end of the semester evaluation of teaching and some other specific topics." This minute paper addressed such issues as pace of the class, presentation techniques, and class involvement. It asked students for background information about their attendance and the time they spend on homework for the course.

On other minute papers Joe asked for information about students' involvement in the learning process. He asked them to identify the most important concepts, and the most difficult concepts. Appendix N contains copies of Joe's minute papers.

With his large classes, Joe didn't ask every student to do a minute paper every time. Instead, he selected about ten of the 100 students, "because you don't want 100 minute papers every day or even every week. It is just too much," Joe stated. "So what I do is choose a number between zero and nine and say, 'All those people whose social security or student ID number ends in six are responsible for writing the minute paper today.'"

Several undergraduates in the large lecture classes were surprised when Dr. Joe asked for input on the minute papers. "No professor ever asked me anything like that before," was a student's typical response.

Joe's Pareto Charts

Joe favored the use of Pareto charts for displaying the data he collected from students' minute papers. His Pareto charts were bar graphs that showed the percentages of responses in each category surveyed. The categories were arranged in priority order. Appendix O contains some of Dr. Joe's Pareto charts.

After the survey, Joe gave the students "summaries," of his Pareto charts. One of the charts indicated that over 80% of the people said that the pace of the class was about right. 10% said the pace was too fast.

Joe asked the students who thought he was going too fast to come in and see him. In those sessions he and the students discussed such issues as prerequisites, tutoring, and the students' other commitments.

"Instructors who are concerned about their teaching will pick up on students' reactions, but they are only the professors' perceptions," Joe declared. "So surveying through the minute papers is getting back to the idea of getting data and not just relying on your own feelings. The idea is to get feedback on how things are going right now," he concluded.

Maynard's Force Field Analysis

Maynard was enthusiastic about his first use of a force field analysis with students who had written, and still were required to write, research papers. His purposes, as stated on the analysis form, were to "(1) Diagnose facilitating and hindering experiences in

individual student's research paper experiences and (2) gather data to better understand groups of students to make systemic changes in curriculum and instruction areas."

Designed jointly with a colleague from the English Department and divided into two vertical sections on the pale grey 17" by 11 1/2" paper, folded lengthwise so that it became a four-page booklet, the two columns were labeled "Positive experiences" and "Negative experiences." Students were to think about their past experiences with each phase of the research paper process and then write about those experiences.

On the force field analysis, students were asked to respond in nine categories. Those categories were: deciding on a research topic/subject, physically gathering resources, intellectually using resources, organizing ideas, general composition, revising the paper, mechanics of edited written English, conventions of a research paper, and budgeting time. Included on the last page were a series of questions designed to give Maynard background information about each student. Appendix P contains a copy of the force field analysis Maynard used.

Maynard used the analysis for the first time with ten students in the class I visited. "They were my random sample, although they weren't very random," Maynard revealed:

> I picked people I had in class before. Some of them do well on writing and some of them don't. That's why I picked them. Also, we had a candid enough relationship that they would respond honestly. The students commented, after they had completed the force field analysis, that they learned a great deal about their own writing and the problems they had.

The writing analysis made Maynard "much more sensitive" to the fact that students perceived their audiences, professors who read their papers, as concerned only with the

research paper conventions. Students felt that the classroom educators were not concerned with the content of the papers.

Maynard told the entire class about the analysis. He said to the students, "I am interested in the content of your papers. I'm not really excited about commas, periods, and parentheses. I'm not going to lose any sleep over them and I hope you're not either."

"About half of the students gave me their first drafts to read. When I read them I was much more concerned with the content than with the form. I provided more positive reinforcement than I did negative jabs," Maynard stated. He laughed about the grammar teacher inside him having to hold back from commenting on punctuation errors.

Maynard concluded that the force field analysis was a good tool, "a legitimate way to identify areas to change." Although he wanted to incorporate the research paper analysis into his classroom instruction, the technique was not approved by the department.

Maynard's department had guidelines in place for each course. The guidelines, according to Maynard's students, were "regulations" that were aimed at "standardization of the curriculum." Students felt that the departmental requirements restricted what professors could do within their classrooms. The students' appraisals, based on Maynard's inability to use the force field analysis within his instructional process, appeared accurate.

Maynard's Survey

One of Maynard's students mentioned another information-gathering technique, used by Dr. M. at the beginning of the semester:

> One of the things he did the first week was that he asked us to list, after reviewing the syllabus, things that look most interesting to us and things that are of concern. Then he will very specifically go through each of those concerns and address them in some way or other during the course.

Analysis of Collecting Feedback from Students

An integral part of Deming's continuous cycle of improvement is the collection and use of data about the process (Walton, 1986). In this study, data collection and analysis are most obvious in Joe's classroom. He regularly surveys students about his lecture presentations. Then he shares the data with the students by illustrating it with quality tools. Joe makes changes in his presentations based on the students' responses.

With the other two respondents, whose classes were only a fourth the size of Joe's, regular collection of data is not as apparent. Rob and Maynard rely more heavily on informal input from their students, a result of their successful efforts to establish a trust-filled classroom environment.

It was evident throughout the interview process that all of the respondents understand the importance of data collection and analysis. For the most part, however, data to support the effectiveness of applying Deming's theory in the classroom instructional process is not available.

Despite the respondents' and students' enthusiasm for quality initiatives in the classroom, the systems within which they all live place requirements on classroom educators. Professors and instructors must still issue grades at the end of each course.

Assessing Students' Progress

Getting feedback from students and using that feedback in a constructive manner was a characteristic demonstrated by the classroom educators. However, all three were inevitably faced with systemic requirements for grades.

All had to assign letter grades at the conclusion of a course. The respondents had differing views about grading. Each respondent's ideas and actions are examined in this section.

Maynard's Assessment

Maynard's department had an expectation "that a B was an average graduate grade." Maynard did not agree with the department, so approached teaching with a logic of his own. As he stepped to an easel and wrote, he said:

> If a B is an average grade then 100% to 90% is an A, and 89% to 80% is a B, and 79% to 70% is a C. The average grade should be about 85%. Roughly, I should have been teaching at about 85% I didn't think 85% was a high expectation for student performance. I didn't think 85% was a high expectation for faculty performance. So I tried to teach at 100%, but students did not consistently make 100% on their examinations. Now I try to teach 110%. If I want them to learn 100%, then I teach 110%, so they can slip and still get an A.

In response to my question about his "100% teaching" and its relationship to minimum competency levels, Maynard admitted that what he had done was establish minimum competency levels by specifying what students needed to learn. By using study guides, Maynard let students know that he "expected them to make A's."

Maynard's students did not agree with each other about Maynard's efforts. One said, "I think Dr. M. has adopted Deming's idea of eliminating grades, because if your paper is not satisfactory, you are given the opportunity to make it satisfactory."

Another student disagreed, "There is another class at the university that many of us have taken that is practically self-graded. If Dr. M. wanted us to assign our own grades, that would alleviate fear even more. I don't know if he goes as far as he could."

Joe's Assessment

When Dr. Joe talked about grading, he referred to Deming's principles, "the ideas of evaluation and final inspection," and their impacts on education. Joe recognized that Deming's stance "strikes right at the heart of grades. The question is," Joe continued, "do you throw out grades completely, and just give degrees on how hard students try?" Joe felt that the answer to that question was "No," but he thought classroom educators should approach evaluation from another angle.

That angle for Joe was to have "levels of attainment" in his classes. His objective was to have all students reach the A level of attainment. "The problem is," Joe stated, "that not everyone who comes into that class is capable of reaching that level because of personal differences in the way they study. That's unfortunate."

Joe had just finished reading Zen and the Art of Motorcycle Maintenance (Pirsig, 1974). He appeared intrigued by Pirsig's ideas concerning grades. "The author," Joe remarked, asserted that not evaluating students "was really Deming's point. In other words,

give students feedback, let them work. Let them determine A, B, C, D," Joe said as he summarized the book.

Joe speculated that without a grading system, students who had come to the university to learn would do so. "They would learn and they would get the information, and they would contribute to society in that way," he said. Others will simply disappear without the "stigma of flunking out of college. They'll go off and do something else," Joe concluded.

Joe found the idea of abolishing grades an interesting one. However, he was not ready to act on it. "The fellow in Zen and Motorcycle Maintenance made an argument that eliminating grades would not turn the educational system upside down. But, I wouldn't want to try it," Joe asserted.

Rob's Assessment

Rob took Deming's concept of eliminating grades and acted upon it. Rob criticized the "efficiency" of traditional grading systems. He disliked the use of gradebooks where evaluations were recorded, points assigned, and grades calculated. Even worse, he said, were "canned packages" for computers where teachers could put in numerical data, the computer would do the work, and grades would come out on the curve with a grade report.

Rob explained that he wanted to create a "quality learning experience" for his students. "I want to have an appropriate way of feeding back to them how they were doing. In my mind," he continued, "the A-B-C-D-F system doesn't cut it. So we have an agreement in the QIPS program."

Temporary Assessment Policy

That assessment agreement Rob described as a temporary one. It came into being as a result of collaborative efforts between QIPS program staff and administrators in the Instructional Services Division of the college. It was designed to comply with state requirements but was also "more consistent with the quality message being taught" in the QIPS program, Rob revealed.

When he explained the unusual assessment agreement to the students, Rob used a drawing of a normal curve. He would labeled it with A-B-C-D-F and then related the sketch to Shewhart's statistical control theory adopted by Deming. He said:

> Anything that falls within three sigma of the mean in a normally-distributed population is normal and should be treated as such. And anything outside three sigma is a special cause. Special causes mean special measures. We take special measures for people who fall outside the limits. We negotiate with them.

The temporary assessment agreement incorporated, as Rob described it, "two systems that don't mesh: the traditional one, on one end, and ours on the other." Under the temporary agreement students who met course competency requirements got A's. Students who did not meet the competency requirements "negotiated" with the instructor. The negotiations usually resulted in an extension of time for students to complete their work. A copy of the temporary assessment policy used in the QIPS program is in Appendix Q.

Rob relied heavily on his own observations and anecdotal records for determining if students had achieved course competencies. The competencies were constructed using "terminology from Bloom's taxonomy," according to Rob. Competencies and accompanying

student performance objectives for each course were recorded in the college's Course Data File (Appendix M). Rob used the performance objectives as the basis for assessing students' learning. Although assigning A or Not Yet under the temporary agreement was a responsibility taken by Rob, students in his class expressed positive comments about assessment processes they experienced.

Several students talked about learning in Rob's classes. One student said:

> We learn the way we do here, without testing. In other classes I have taken, you get as much as you can in your brain so that you can take that test, and then lose it two weeks later. It sticks better the way we learn it here, from each other, and the way we work. There's not the pressure of how much you can memorize.

Another student reported:

> We work in teams and do projects and presentations to the other members of the class. We divide into groups, with each group doing a different topic, and then we present to the other groups what we've learned. I have found out that I learn a lot better when I teach someone else. It's like doing it twice.

A third student continued, "I think that if Rob felt that you were not participating then he would do a one-on-one to find out why. In a class this size, the instructor can have a really good feel if everyone is participating and grasping the information."

The last student spoke about assessment. Her comments summarized what the students in the class were telling me:

> There's a requirement here. We don't have tests, and yet when we are done with this we are required to prove that we have learned. That might be through projects or different presentations that we come up with on our own. But there aren't any true and false tests, no essay questions, or anything like that. There is a list of requirements that we are going to have to meet before we can leave this class. And we are required to prove that we have met them.

Assessment Policy Development

The QIPS Advisory Committee took an active role in guiding the program. Members were very involved in the development of a more permanent assessment policy.

Committee member Jacob, an educator himself, described the meetings of the advisory group:

> This is one of the first committees I have been on where we break out in teams during the meetings. That is something kind of unique in my experience. The meetings are very open. We have very frank discussions. Then we try to come to resolution, something, at least for education, that's kind of new. Usually educators talk and talk, and somebody makes a decision somewhere else. I see the committee meetings as really working meetings.

The advisory committee "spent the last five meetings" talking about an assessment policy, Rob disclosed. Committee members divided on the basic issue of the appropriateness of a policy.

Some members thought it was a good idea to take the leadership in developing a new policy. This group was eager to start the process that could potentially initiate changes at the state level. Other members preferred to wait. "No, we have to get the state to change first before we can do this. Then the universities have to change. And we've got to change the minds of employers who look at grade point averages, too," they said.

"The debates continued," Rob reported. "When we had basic agreement, we worked on the agreement. Then the disagreements went away."

Both advisory committee members spoke about the debates and the concerns expressed about breaking away from the traditional grading policy. Some advisory

committee members initially opposed a change away from the traditional A-B-C-D-F grading system. One of their major concerns centered on industry's preference for grades because, as Kevin revealed, "grades made it easy to select people for interviews."

"Let us interview your A people," Kevin said as he referred to industry's search for new employees. "They said, 'If you don't have A-B-C-D, do we as employers have to interview everybody?'" Kevin's answer to that question was, "If the program works right, you can pick anyone."

When Jacob talked about the employment issue, he revealed what he said to doubting advisory committee members:

> If you were Employer X and you got all the A students, then what about Employer Y who only got the D students? Are we really making a better work force with the traditional grading system and throwing people out there with D's? Somebody, because of supply and demand, is going to hire the D's. Wouldn't it be better if we kept those D's in the program a little longer, used another method, or went another way to assure that all students would achieve the competencies?

Jacob continued by talking about "opportunity costs." He noted that people with "ability" would "get through the program quicker, be in the job market faster, and be promoted quicker. There are still advantages other than an A grade of learning rapidly," Jacob said. "In addition," he concluded, "we should strive to keep learning from being a bad experience for students."

After much discussion the advisory committee "finally reached concurrence" on a new assessment policy, Kevin reported. The committee decided that the process, not the students, was not working when students failed to pass courses in the QIPS program.

Permanent Assessment Policy

The new assessment policy was designed with three components or "three stool legs," as Rob described them. The first "leg" of the policy included the criteria for assigning state-required grades. The second portion listed all the course objectives and placed them on a matrix with Bloom's taxonomy. The third segment of the new policy incorporated a student portfolio.

Not all of the details of the assessment policy had been completely worked out prior to my last discussion with Rob. The advisory committee had requested from Rob a detailed, written plan incorporating the three policy components.

The first part of the proposed policy was framed "within the context of quality work," Rob stated. The committee looked at Glasser's model, taken from The Quality School: Managing Students Without Coercion (1992). In the book, Glasser suggests the idea of A-B-Not Yet.

"Students have to understand what quality work is," Rob explained. "Glasser said that an A is quality work. B is work that is acceptable, but may not be completely quality work. Not Yet means that the student work doesn't merit any grade yet," he said.

Quality work cannot be simply defined. In one interview with Rob, he explained that quality work stems from intrinsic motivation. "We have never taught our children about quality work, nor have we ourselves ever learned about quality work in school," Rob said.

Rob explained quality work to me even further when he said:

> Think about a time when you were really interested in something or really wanted to learn because there was a purpose to it. You thirsted after it. Maybe you stumbled a little bit as you experimented, but you went after more. You found people who could help you. Wasn't that a true learning experience?
>
> The whole key is to get students from the 'I have to do this' mode to the 'I want to do this' mode. That's it in a nutshell.

Rob felt that when students reached the 'I want to' mode, quality work could be negotiated between students and instructors. Rob asserted that instructors should set standards and let students know what those standards were. Then classroom educators should leave enough latitude so that students had flexibility in achieving the standards. "Give students options, information about all alternatives, and let them choose. Then require them to do what they have chosen: quality work," Rob concluded.

One of Rob's students had a list of items brainstormed by the class at the beginning of the semester. The hand-written list on white, lined notebook paper, was entitled, "What Is Quality Work?" It listed 17 aspects of quality work: pleasing the customer, comprehension vs mimicking, exceeding expectations, participation, team effort (synergy), students teaching students, combining resources, new concepts and paradigms, feedback, communication, different learning styles, usefulness (application of life/work), reliability and preparation, ground rules (trust), focus and facilitation, sharing, and mission.

Rob shared a simple example of quality work. When students asked about using a typewriter or word processor for an assignment, he put the question "to a test." He prompted students to think about their own work environment when he said:

> If you were going to provide a report for someone, would they accept it in a handwritten format? If so, I'll accept your handwritten paper. If not, I would expect you to do your paper in the format you would have to use at work. It's your choice.

A matrix for each course in the QIPS program was being developed. The course matrices formed the second piece of the new assessment policy. Modeled after the system used at Alverno College, each course's objectives were structured on a chart with Bloom's taxonomy levels recorded to the right. Bloom's six levels, listed from simple to complex were information, comprehension, application, analysis, synthesis, and evaluation. The first page of a matrix designed for the course, Scientific Method II, is shown in Appendix R.

As he referred to the matrix, Rob said:

> As you can see all the objectives were merged with Bloom's taxonomy. Students may need to reach one level of the taxonomy for one objective, and a different level for another objective. We are currently setting those levels and creating a frame for each course.

Student portfolios were the third part of the new assessment policy. Rob described the portfolios as "running, living documents" of the students' work. He explained that students chose what work they wanted to include in their portfolios. Students were urged to include quality work and to show their progress by including early work along with the finished products. "We have already introduced the portfolio concept to students," Rob reported.

Jacob also talked about portfolios. "I had to do one for Rob's class last time. I would probably not have ever put one together if it were not for this class," he said. Jacob related that he would be discouraged if the QIPS program went back to the "old traditional

way of grading." Because he was involved in "leading the portfolio charge" in his school district, he needed "a model. I need a successful program to point to," he said.

Kevin, the program chair, was enthusiastic about the proposed policy. He felt that potential employers would find it very useful. "If the employer wants somebody for a certain position who is stronger in one area, the new assessment will reflect the key positions of the student candidates," he said.

Analysis of Assessing Students' Progress

Students' self-assessment is an important element of the proposed QIPS assessment policy. As stated by people in the focus group, as well as those who responded to the follow-up questionnaire, Deming instructors or professors should 'engage their students in self-evaluation activity."

Decreasing the amount of "mass inspection" (Deming, 1986, p. 28), as Deming calls traditional testing, can occur through "employing a variety of evaluation strategies and using more individualized or personalized evaluation with students," the focus and follow-up groups say. The QIPS program's proposed assessment policy meets these groups' criteria for self-assessment.

Totally eliminating grades, as proposed by Deming (1993), is impossible for all three respondents. Although they all recognize Deming's suggestions that grades should be abolished, Rob is the only one to attempt to do so.

The technical college within which Rob works is open to proposed change. Because the college administration is willing to risk adoption of an alternative assessment policy for the QIPS program, Rob's students are not part of a traditional grading structure. However, an even more powerful system, the state's requirements for grades, prohibits the elimination of grades.

Summary of Research Findings

The respondents in this study apply Deming's philosophy and principles to the teaching and learning process. Although some of the strategies and techniques the respondents use are not new ones, their focus on Deming and their subsequent attempts to infuse his ideas into the classroom are what distinguish them from other educators.

As illustrated in this chapter, three postsecondary classroom educators use Deming's ideas in their instructional processes. From demonstrating their own knowledge about Deming to negotiating a new student assessment policy, the educators in this study are providing examples for other classroom educators who want to apply Deming's philosophy and principles to the teaching and learning process in higher education.

CHAPTER V

CONCLUSIONS

Literature about quality issues in higher education indicates that Deming's principles can be applied to colleges and universities. Although most of the applications have been made to non-instructional functions of postsecondary institutions, the respondents in this study have illustrated that Deming's philosophy and principles can be applied to the instructional process.

This chapter has four sections. The research questions, posed before the study began, are addressed first.

In the second section, a synopsis of a Deming educator revealed in this study is presented. In the third section, an ideal conceptual model of a Deming educator is synthesized from the data and from the literature about quality in the classroom.

Suggestions for further research are offered in the last section of this chapter. Recommendations are made for future research studies.

Responses to the Research Questions

Before the research study began, eight research questions were determined. Responses to each of the eight questions posed in Chapter I and one additional concern suggested in Chapter III are summarized in the first section of this chapter. The additional question, because of its focus on the respondents' backgrounds will be addressed first. It is designated as Research Question 0 and is followed by the eight original research questions.

Research Question 0

The question from Chapter III is stated in non-interrogative form. It reads, "Explain why the selected respondents decided to adopt Deming's philosophy and principles in their classroom instructional process."

Because there are three respondents in this study, there are three responses to this research inquiry. Each individual's reasons for deciding to adopt Deming's ideas to his teaching and learning process are described.

Dr. Joe, a university statistics department faculty member, knows about Deming because Deming, too, was a statistician. Joe became interested in using some of the quality tools in his instructional process while teaching a quality and productivity course and while doing quality consulting. He feels that applying Deming's ideas to the teaching and learning process is a logical extension of Deming's philosophy and principles.

Dr. Maynard M. developed his interest in Deming after reading Walton's (1986) book, The Deming Management Method. Maynard applies Deming's ideas to the instructional process because they seemed to fit with "principle-centered leadership and value-driven behavior" suggested by other authors like Goldratt and Cox (1986), Covey (1989 & 1991), and DePree (1989).

Rob's interest in Deming developed prior to his employment as an educator. Before coming to the college, he worked on a quality team in a major industry. When hired by the technical college to chair a new quality improvement process vocational education program, he was charged with bringing quality principles into the instructional process.

Research Question 1

The first question from Chapter I is, "What attitudes about teaching and learning did the selected respondents hold?" Attitudes, as defined in this study, are manners of thinking that reveal educators' beliefs about the instructional process.

The respondents are individuals that understand Deming's philosophy and principles and have a sincere desire to apply his teachings to the instructional process. They are risk-takers who are willing to make changes in their classrooms as they adopt Deming's ideas to teaching and learning.

The three major respondents in this study all regard their students as primary customers in the instructional process. They listen to their student customers and make modifications to their curricula and teaching methods based on customer input.

Facilitating the instructional process for their students is characteristic of the respondents. They believe that the teaching and learning process, not the students, should be managed by classroom educators.

The respondents are willing and eager to share their ideas and experiences with colleagues. In addition, they constantly seek to improve their own professional abilities.

Research Question 2

The second question is, "How did the selected respondents perceive quality in the classroom?"

In this study, each respondent places a different emphasis on quality in the classroom. Each person's emphasis is described in this response.

Joe surveys his students frequently and shares the results of the surveys with them. He makes changes in his instructional process based on the students' input.

Maynard places emphasis on reducing students' fears about learning. Creating detailed course study guides, for instance, is one technique he uses in his attempts to eliminate fear in the classroom.

Rob makes extensive use of student teams in his classroom. His emphasis on teamwork reinforces Deming's quality philosophy and principles.

Research Question 3

The third research question is, "How did the selected respondents apply Deming's principles and philosophy to the instructional process?"

Responses to this question are similar to the responses in the previous question. Surveying students, attempting to reduce students' fears about learning, and emphasizing teamwork are all methods of applying Deming's ideas to the instructional process.

The respondents clearly define course objectives and share those objectives with their students. They assume classroom leadership by developing and maintaining customer focused instruction and by setting expectations with students. As the instructional process continues, the respondents involve students in the planning and delivery of learning activities.

Research Question 4

The fourth question is, "What strategies and techniques, reflective of Deming's philosophy, were being used by the selected respondents?" Strategies, as defined in this study, are educators' overall schemes for accomplishing their classroom objectives. Techniques are specific methods or procedures used by the study respondents that support strategies.

Several instructional strategies and techniques are summarized in the responses to previous research questions. In addition, Chapter IV contains many specific examples of classroom activities that reflect Deming's philosophy. From asking students to create a standard operating procedure for making a peanut butter and jelly sandwich to using a force field analysis to obtain information about students' experiences in writing research papers, the respondents demonstrate diversity in their applications of Deming's philosophy and principles to the instructional process.

An alternative assessment policy developed for students in the QIPS program reveals the greatest departure from traditional educational practice in this study. Rob, with help from his administration and his program advisory committee, is acting on Deming's assertion that grades be eliminated by creating a "quality" assessment policy.

Research Question 5

The fifth research question is, "How did the study's respondents assess the effectiveness of their strategies and techniques?"

Although assessment of students' progress is incorporated into each respondents' instructional process, assessment of the effectiveness of the classroom educators' strategies and techniques is not as evident. Joe's emphasis on regular, continuous collection and analysis of student feedback begins to address the effectiveness issue.

Research Question 6

The sixth question is, "What were the similarities and differences in the quality approaches being employed by the study's respondents?"

The quality approach used most often by all three respondents is teamwork. Each respondent utilizes student teams in his instructional process. Other similarities occur with the formation of specific curriculum competencies. In addition, the respondents have similar attitudes described in the responses to the first research question.

The differences in the respondents' approaches to quality instruction occur in the methods they choose for their classroom teaching and learning processes. As indicated previously, Joe places emphasis on surveying students. Maynard stresses the importance of specific course objectives. Rob believes that grades should be eliminated and takes steps to do that.

Research Question 7

The seventh research question is, "How did students perceive the quality methods of the educators selected as respondents for this study?"

Students, particularly those familiar with Deming's ideas, like the comfortable learning environments established by the respondents. They are pleased with the educators' efforts to establish trust, to listen and respond to student concerns, and to promote cooperative work groups within the classrooms.

Research Question 8

The last question posed is, "Are Deming's philosophy and principles appropriate for instruction in postsecondary educational institutions?"

Deming's philosophy and principles can be applied to the instructional process in postsecondary classrooms, as illustrated in this study. Based on this research, Deming's ideas appear to be particularly appropriate with mature students.

A Synopsis of a Deming Educator

A synopsis of a classroom educator who adopts the philosophy and principles of Wm. Edwards Deming to his or her instructional process is created in this chapter. It is established from the research gathered in this study. Information gathered primarily from the sample of three postsecondary classroom educators is used to create a conceptual model of a Deming educator.

The synopsis is presented in three segments. The personal characteristics of a Deming educator are described first. The respondents' traits, exemplifying Deming's qualities of leaders, are analyzed and summarized.

Next, a Deming classroom educator's instructional process is depicted. Portions of each respondent's teaching and learning process are illustrated.

In the third segment, an ideal system for a Deming educator is described. The systems where the respondents work are examined.

Personal Characteristics of a Deming Educator

Deming educators exhibit personal characteristics that correspond with Deming's philosophy and principles. They display knowledge of Deming's ideas, demonstrate an attitude of customer orientation, show flexibility in their work with students, build classroom environments of mutual trust and respect, and are constantly involved in professional self-development efforts.

Knowledge about Deming's Ideas

A Deming educator demonstrates knowledge of Deming's philosophy and principles and is enthusiastic about applying them to the instructional process. The educator is one who believes that Deming's ideas can successfully be applied to teaching and learning.

In this study, all three major respondents demonstrate extensive knowledge about Deming's philosophy and principles. They are enthusiastic about bringing Deming's ideas into the teaching and learning process. All believe that quality principles, advocated not only by Deming but by other experts as well, can be successfully incorporated in the postsecondary instructional process.

Customer Orientation

Individual Deming educators, as illustrated in this study, regard students as their most important customers. The three classroom educator respondents are not hesitant about viewing students as customers.

The respondents reference other important customers. "Customers of the content," the name given to this group by Dr. Joe, are identified by all three classroom educators. Rob is able to utilize these customers to a far greater extent than is Joe or Maynard.

Rob's use of the program advisory committee is more extensive than I have ever experienced in my tenure as an administrator of associate degree vocational programs. The advisory group, for instance, is particularly active in formulating curriculum change and has taken an active part in developing the permanent QIPS assessment policy.

All of the respondents listen to their customers, respond to feedback, and demonstrate flexibility in their teaching and learning processes. Although listening and responding to customers of the content is important, listening to student customers and subsequently acting upon the information obtained from them, are also characteristic of the classroom educators depicted in this study.

Students and other customers regard Deming educators as leaders in the teaching and learning process. The classroom educators in this study exhibit leadership as they serve as mentors, resource persons, and facilitators of the instructional process.

Flexibility with Students

During the teaching and learning process, the classroom educators demonstrate flexibility with their students. From adjusting the focus of instruction during one class period to accommodating students with legitimate reasons for missing a class, the educators in this study all reveal flexibility in their instructional processes.

Trust and Respect

Classroom educators who apply Deming's theory of profound knowledge begin their teaching and learning processes by building an environment of mutual trust and respect between themselves and their students. Students are treated as peers in the classroom. Students' opinions and experiences are valued. Students express their thoughts freely during the teaching and learning process. Deming educators, by encouraging students to become risk-takers in the classroom, help students build self-esteem as learners.

Students in Maynard's and Rob's classes are particularly positive about their relationships with the classroom educators. They like being treated as peers, or equals, and feel that this can happen more readily in a small classroom environment. Students stress the importance of their classroom educators' abilities to make the classroom a comfortable place where learning occurs.

Professional Self-Development

Classroom educators who adopt Deming's ideas are continuously seeking to improve their own professional competence. In addition, they are willing to share their personal successes and failures with colleagues.

All three classroom educators in this study are concerned with their own professional development. They express a desire to learn more and surround themselves with resources that assist them in their own learning experiences. The respondents seek out professional development opportunities and share their own knowledge and expertise with others.

The Instructional Process of a Deming Educator

Classroom educators who adopt the Deming philosophy and principles in their instructional processes incorporate a number of strategies and techniques into their teaching and learning processes. They develop explicit learning objectives, gain knowledge about their students' backgrounds and learning styles, use students in planning instructional activities, promote teamwork, adopt alternative assessment methods, and create continuous improvement mechanisms for their instructional processes.

Learning Objectives

When Deming educators plan for the instructional process, they develop explicit competencies for the courses they teach. Although this development may happen at a

departmental level, assistance of external customers, who participate in a group process to determine appropriate curriculum competencies, is essential.

In this study, respondents are guided by specific course competencies. Although it is obvious that Rob's course competencies developed from goals determined by external customers, it is not evident that customers of the content had input into the development of competencies for Maynard's courses. Some customer input for the introductory statistics course in Joe's department is indicated.

Even when customer contributions to the curriculum are not evident, classroom educators who adopt Deming's philosophy and principles specify course goals and objectives and then share them with students. In this study Maynard's shared lesson plans provide the most lengthy example of course competencies given to students.

Knowledge about Students

Deming educators demonstrate knowledge about different styles of learning. They use tools, such as learning styles inventories, to determine how individual students learn best. Classroom educators who subscribe to Deming's ideas also collect information about their students' preparations for the learning experiences offered in each course. After receiving that information, they plan instruction around the learning styles and backgrounds of their students.

In this study Dr. Joe obtains information about his students by using a simple Background Knowledge Probe at the beginning of the term. Rob makes extensive use of a learning styles inventory. He uses the information in structuring team learning activities.

Planning with Students

Students assist in planning for instruction in classrooms facilitated by educators who follow Deming's philosophy and principles. Classroom educators are sources of information for students as they plan. Educators serve as consultants responsive to students needs and concerns.

Students are involved in planning how course objectives will be achieved. A good example of planning with students in this study is illustrated in Rob's strategy for determining who will be invited to the classroom as a guest speaker. As demonstrated in this study, student teams are often formed to accomplish instructional objectives.

Promoting Teamwork

Teamwork is an integral part of a Deming instructor's delivery process. The respondents in this study make extensive use of student teams. Teams of students work together on course competencies both inside and outside the classroom.

In this study students in the respondents' classes are all involved in group learning experiences. The classroom educators involve students in teamwork by structuring a variety of activities. Teamwork includes simple discussion groups, project teams, and even teaching

teams. All teamwork experiences promote cooperative learning opportunities for students during the instructional process.

A Deming educator also promotes teamwork and cooperation by neutralizing competition for grades.

Alternative Assessment

When educational systems allow, classroom educators who adopt Deming's philosophy and principles to the instructional process abolish traditional grading practices in the classroom. They involve students in self-assessment strategies.

Most systems restrict classroom educators from eliminating traditional A-B-C-D-F grades. Even if educators are convinced that abolishing grades, as Deming suggests, is desirable, larger systems control grading policies.

In the classroom, it is possible for an educator to use alternative assessment techniques. Those suggested by Angelo and Cross (1993) fit into Deming's ideas and can be adapted to most learning environments. The larger issue of grading is not one that an individual classroom educator can address without considering systemic rules and regulations.

Continuous Instructional Process Improvement

Learning is a continuous process in the Deming educator's classroom. Within the continuous cycle of learning, the Deming educator, in cooperation with the students,

regularly collects, examines, and analyzes data about the learning progress of each student and about the entire group. The analyzed data, illustrated via a variety of quality tools, are used to assist in the improvement of the teaching and learning process.

The respondents in this study demonstrate thorough knowledge of Deming's philosophy and principles. However, the weakest part of the instructional processes is in the areas of data collection and analysis. Of the three respondents, Dr. Joe gathers the most data from students. He does this several times each semester. Maynard collects data from students at the end of the term, as does Rob. Data for curriculum development is most prevalent in Rob's program.

Joe uses his analyzed data to improve his lecture presentations. Maynard uses his to make improvements for the following term. QIPS program curricula are grounded in customer-input data.

Despite these indications of data collection and use, none of the respondents have an overall assessment program built into their teaching and learning process.

A System for a Deming Educator

Classroom educators in this study are regarded as managers of the instructional process. However, all of them work in systems that extend far beyond their own classrooms. Although none of the respondents works within an ideal quality system, portions of their systems fit into the Deming model.

Systemic features and concerns emerged during the study. They are: Systemic Ideology, Systemic Commitment, and Systemic Barriers.

Systemic Ideology

An institution of higher education, supportive of Deming's ideas, places high regard on its customers. In postsecondary educations' instructional areas, customers are identified as students, as well as departments, courses, schools, or potential employers who receive students from the instructional programs.

Although all three respondents in this study identify their customers, two of the systems within which the respondents work do not appear nearly as interested in doing so. The technical college is the exception.

Rob's employer introduced quality thinking into the organization nearly ten years prior to this study. As a result, the technical college formally identifies its customers and repeats the process of customer identification regularly. Quality principles and procedures are an integral part of the college's culture.

Joe's and Maynard's universities are much older and larger than the technical college. They are more traditional educational institutions, thus indicating that change there is most likely slower than in the technical college.

Systemic Commitment

Deming stresses the importance of commitment to quality by a system's top management. In a Deming educational system, administrators actively support faculty efforts to bring quality principles and procedures into the instructional process.

Respondents experience varying degrees of administrative commitment to their classroom quality ventures. Of the three, Rob's administration exhibits the most commitment to quality principles.

Hired originally to chair and teach in a program designed to prepare students to work in business and industry quality departments, Rob's employers expect him to use quality principles in his instructional process. Thus, he had administrative support for his efforts even before he began to teach.

The curriculum designed for the QIPS program is based on customer input, obtained from business and industry leaders. Administrators utilized a customer-oriented curriculum development process prior to hiring Rob.

As the curriculum was implemented, Rob relied on the expertise of an advisory committee, composed of some of the same leaders who originally contributed to establishing the program competencies. The committee still works closely with Rob to strengthen the QIPS program.

The college administration supports advisory committee participation. As is common in vocational education, programs must have an advisory committee.

Administrative commitment from the technical college is evident in their support of the QIPS assessment policy, also. Although bound by state regulations for grades, they allowed the alternative assessment policy to develop in the QIPS program.

Administrators in Joe's and Maynard's systems do not actively demonstrate support for quality initiatives in the teaching and learning process. Although Joe's department allowed a survey of customers for curriculum development purposes in the introductory statistics course, no other evidence of administrative encouragement for including Deming's ideas in the classroom instructional process is revealed in this study.

In Maynard's case, the department administration appears to squelch efforts to incorporate Deming's philosophy and principles into the instructional process. The department, for instance, establishes strict requirements for assessment, thereby restricting Maynard's efforts to explore alternative options. Department administration also prevents the use of a simple quality tool, the force field analysis, in Maynard's classroom.

Despite these obstacles, both Joe and Maynard still initiate some quality approaches in their classes.

Systemic Barriers

An ideal educational system, as described by Deming, has no barriers between its components. All segments of education, from kindergarten through the university, are connected. There are no obstructions between institutions within postsecondary education, nor are there any systemic barriers between components of an individual postsecondary

institution. In a Deming system all employees work together to facilitate the learning experiences of students.

Obstacles do exist between educational institutions. Systems of elementary, secondary, and postsecondary education remain, for the most part, as separate entities.

Within a single system, e.g., a college or university, systemic barriers endure. As revealed in this study, some of the systemic barriers, like class size, arrangement of classroom furniture, and even student evaluation standards, can be addressed in a manner more in keeping with Deming's philosophy and principles.

Class size poses a problem for classroom educators who want to incorporate Deming's philosophy and principles in their instructional processes. As revealed in this study, when educators' classes are small enough to allow them to become acquainted with individual students and their needs, the educators incorporate Deming's ideas much more easily than when classes are large.

Dr. Joe talks about his experiences primarily with large lecture classes, although he teaches sections of classes that are much smaller. He indicates that, because of sheer numbers, it is "easier" to implement Deming's principles in the small sections.

In contrast to Joe, Maynard and Rob both have classes with less than 20 people enrolled. They know their students as individuals. In Rob's and Maynard's classes, the small numbers of students enhance their efforts to establish comfortable learning environments.

Besides small class enrollments, classrooms equipped with movable furniture provide advantages for Maynard and Rob. They and their students rearrange their classrooms and provide flexibility for instructional activities. Dividing students into teams, for example, is not difficult to accomplish when chairs and tables are easily reordered.

Postsecondary institutions can initiate alternative student assessment policies that enhance Deming's assertions that final inspection and rating or ranking of individuals are not desirable. Rob's college is supportive of this Deming concept. The college allowed the adoption of a policy that met the state mandate for grades, but removed the pressure created by grades from the students in the QIPS program.

Rob's students assert that the lack of a traditional grading system is, in part, responsible for their comfort with the learning environment. The assessment strategies in the QIPS program promote cooperation, rather than competition, between students. Students feel that cooperative learning experiences are beneficial to them.

Elimination of traditional grading systems in education is a concept that is overwhelming in its scope. Although there are some institutions willing to try alternative assessment strategies with students, they are still in the minority, particularly in postsecondary education. As demonstrated in Rob's system, progress towards alternative assessment can be made. Those efforts must be led by an educator who understands and values Deming's theory of profound knowledge.

A Conceptual Model of a Deming Educator

A conceptual model of a postsecondary classroom educator who applies the Deming philosophy and principles to the instructional process is created from this study. The model includes the following:

A Deming educator demonstrates the following personal characteristics:

1. *Knowledge of Deming and a desire to apply his ideas to instruction.*
2. *Positive attitudes towards customers.*
3. *Flexibility in adjusting instructional strategies and techniques.*
4. *Trust in and respect for students.*
5. *Desire to improve his/her professional competence.*

During the instructional process a Deming educator demonstrates:

1. *Variety in classroom strategies and techniques.*
2. *Competency based curriculum developed with customer input and shared with students.*
3. *Knowledge about individual students' backgrounds and learning styles.*
4. *Involvement of students in planning instructional activities.*
5. *Use of student teams.*
6. *Alternative student assessment strategies.*
7. *Continuous process improvement.*

An organizational system favorable to Deming's ideas demonstrates:

1. *High regard for customers.*
2. *Administrative commitment to Deming's philosophy and principles.*

Implications for Future Research

In this research study descriptions and analyses of three people, as well as the strategies and techniques they used to implement Deming's philosophy and principles into their instructional processes, have been described. From that information, a profile of a Deming educator was conceived. As the study concludes, suggestions for future research are proposed.

The organizations within which Deming educators are attempting to apply their strategies provide settings for future research. Studies of the organizational cultures in higher education institutions and their relationships to Deming's profound knowledge can be examined.

Any of the personal characteristics of Deming educators revealed in this study suggest in-depth study and analysis. Future research questions may address such topics as building relationships of mutual respect with students, developing students' intrinsic motivations to learn, or examining the effect of classroom environments on the teaching and learning process.

Instructional processes of educators using Deming's philosophy and principles in classroom instruction can be explored in more depth. More extensive investigation may be

done with any one of this study's instructional processes. Preparation for instruction, involving students in the learning process, collecting and using students' feedback, and assessing students' progress can all be studied more thoroughly than was done in this research.

The effects of using Deming's philosophy and principles in the teaching and learning process have not yet been explored. The conceptual model of a Deming educator provided in this study may be used as a beginning for further research.

This research reveals that classroom instructors and professors are able to apply Deming's philosophy and principles to the teaching and learning process in higher education. Determining the effectiveness of such applications remains for future research efforts. The topic of effectiveness, perhaps more than any other, needs to be researched.

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APPENDIX A

FOCUS GROUP INTERVIEW MEMBERS

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Dr. Barbara Flynn
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APPENDIX B

QUESTIONNAIRE, LETTER, AND RESPONDENTS

Dr. Leo Bradley
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Dr. Lawrence Byrnes
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Dr. Daniel Brobst
Vice President for Instruction
Hawkeye Community College

Dr. Gerald Chase
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Dr. Bert H. Peachy
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Dr. Steven Richardson
Director, Center for Teaching Excellence
Iowa State University

Dr. Jose Romero-Simpson
Department of Management
University of Miami

Mr. Jon Stenerson
Faculty Member
Fox Valley Technical College

LETTER WITH QUESTIONNAIRE

September 8, 1993

Dear XXX:

As part of my doctoral research at Iowa State University, I am attempting to determine the characteristics of professors who adapt the philosophy of William Edwards Deming to their classroom instruction.

You have been identified as a person who understands Dr. Deming's work and is also knowledgeable about the teaching and learning process. I need your help in assisting me in distinguishing the attributes of "Deming" professors.

Enclosed is a list of characteristics generated by a focus group of higher education professionals. After brainstorming, the group created an affinity diagram which is reflected on that list. I know you are busy, but would appreciate your taking a few minutes to review the characteristics, delete those you feel are not pertinent, and add any that fail to appear.

Any comments or suggestions you might have about this process or about my research project would be appreciated. I will send you a copy of the list of characteristics when it is completed.

An envelope is enclosed for your convenience. Will you please return the form to me by October 1, 1993?

Thank you for your help. I value your assistance in this endeavor.

Sincerely yours,

Jane Andrews
240 Raphael Avenue, #14
Ames, IA 50014

CHARACTERISTICS OF A PROFESSOR WHO USES THE QUALITY PHILOSOPHY IN CLASSROOM INSTRUCTION

Promotes continuous improvement by:

*continually revising teaching methods.

*continually revising curriculum.

*demonstrating a willingness to correct own deficiencies.

*demonstrating a willingness to be evaluated.

*sharing successes and failures with colleagues.

*leveraging resources.

*engaging in self-development.

*applying research-based instructional strategies.

Facilitates students' learning by:

*empowering the learners.

*encouraging learners to become risk-takers.

*rewarding students.

*sharing students' successes.

*maintaining a sense of enthusiasm for teaching and learning.

*eliminating students' fears about learning.

*eliminating students' fears about the learning environment.

Breaks down student-faculty barriers by:

*involving students in planning learning activities.

*using an appropriate mix of instructional methodologies.

*using team learning approaches.

*using student expertise when appropriate.

Ceases dependence on "mass inspection" (Deming, 1986) by:

*employing a variety of evaluation strategies.

*using individualized evaluation.

*providing frequent feedback.

*engaging students in self-evaluations of their learning.

Continuously monitors the learning process by:

*collecting and analyzing data.

*using data for improvement.

*monitoring and adjusting to feedback.

*using diagnostic tools to discover students' learning strengths and weaknesses

*using research strategies within the teaching-learning process

Meets the needs of the customer by:

*focusing on clients.

*identifying the customers of the teaching-learning process.

*assessing customer needs.

*assessing customer expectations.

Maintains constancy of purpose (Deming, 1986) by:

*planning instruction around mission and purpose.

*making expectations clear to students.

*relating learning to real-life situations.

*teaching students to transfer learning to real life.

*gathering and using data for long-term planning.

APPENDIX C

MAJOR RESPONDENTS' RELEASE FORM

PHD DISSERTATION CASE STUDY RELEASE FORM

I _____ agree to participate in the case study according to the following terms:

1. The information obtained during this study and the written document produced may be read by any interested person.

2. Actual names of respondents will not be used in the case study. However names of major respondents, i.e. professors and instructors, will be listed in an appendix.

3. The research contributions of the respondents will be clearly acknowledged in any publications resulting from this case study.

4. Student respondents will not be identified in the appendix.

5. Direct quotes from respondents will be written into the case study report.

6. Each major respondent will receive a copy of the completed dissertation.

7. A respondent may withdraw from the study by arrangement with the investigator. This action must take place before the case study is completed.

I agree to participate in the case study according to the terms listed above.

_____
Respondent

_____
Date

I agree to conduct and report the case study according to the terms of the agreement.

Jane Andrews
Investigator

3/11/94

APPENDIX D

ASSURANCES TO STUDENTS

The purpose of this study is to identify, describe, and understand the characteristics, teaching strategies, techniques, and evaluation methods of selected postsecondary educators who are applying the philosophy and principles of Wm. Edwards Deming to their classroom instruction.

In doing this, the investigator will create a profile of a "Deming" instructor, an imaginary person synthesized from the various traits of respondents interviewed for this study.

In the study, pseudonyms will be used to identify the professors and instructors. Students will be identified only by general classification, i.e., majors or members of a certain class.

All interviews will be audio taped and then transcribed by the researcher. The tapes will be erased when the study is completed.

Participation in the study is voluntary. Comments that students make to the researcher will be considered confidential. However, some direct quotes may be incorporated into the text of the study. In such cases the speaker will be identified only by general classification.

Students who choose not to participate should feel free to leave the room or remain silent during the discussion with the researcher.

Jane Andrews, Investigator
(515) 292-8205

APPENDIX E

ADVISORY COMMITTEE RESPONDENTS' RELEASE FORM

PHD DISSERTATION CASE STUDY RELEASE FORM

I _____ agree to participate in the case study according to the following terms:

1. The information obtained during this study and the written document produced may be read by any interested person.

2. Actual names of respondents will not be used in the case study. However names of major respondents, i.e. professors, instructors, and advisory committee members, will be listed in an appendix.

3. The research contributions of the respondents will be clearly acknowledged in any publications resulting from this case study.

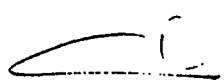
4. Student respondents will not be identified in the appendix.

5. Direct quotes from respondents will be written into the case study report.

6. Each major respondent will receive a copy of the completed dissertation.

7. A respondent may withdraw from the study by arrangement with the investigator. This action must take place before the case study is completed.

I agree to participate in the case study according to the terms listed above.

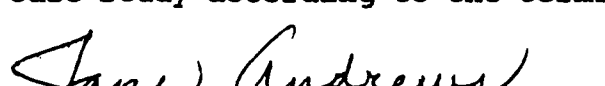


Respondent

3/21/94

Date

I agree to conduct and report the case study according to the terms of the agreement.



Investigator

3/16/94

APPENDIX F

JOE'S STUDENT SURVEY

STAT 402 Questionnaire

1. Name: _____

2. Year: Soph. Jun. Sen. Grad.

3. Major: _____

4. When did you take STAT 401? _____
   (semester & year)
   If you have not taken STAT 401, please see the instuctor after class.

5. Have you used the Statistical Analysis System (SAS)?
   - Yes **(GO TO QUESTION 6)**
   - No **(GO TO QUESTION 8)**

6. How comfortable are you using SAS?

1	2	3	4	5
Very Comfortable	Comfortable	Neutral	Uncomfortable	Very Uncomfortable

7. What platform(s) do/did you use to run SAS?
   - Mainframe via Wylbur
   - PC
   - Project Vincent
   - Other _____

8. Why are you taking this class? _____

_____

_____

_____

APPENDIX G

MAYNARD'S STUDENT SURVEY

Name:_____ [S522-Asmt.001]930107

EdAd 522

Management of School Personnel

Student's Self-Assessment: "Course Objectives"

Listed below are the Course Objectives for which this course is responsbile and for which this course contributes. In the space provided (or more if you must) provide a self-assessment how your performance in the course met each outcome at the understand or demonstrate level.
This is an individual, reflective activity (not a group project).
This is due at the end of the last class session.

This course is responsible for the following Course Objectives for Leadership Candidates ("LC"):

☐ 11.04 (Staff development) -- The LC understands how to involve staff in the recruitment and development of staff.

☐ 13.10 (Resource allocation) -- The LC understands how to adjust human and financial resources to meet changing needs.

☐ 14.05 (Motivating others) -- The LC demonstrates an ability to work fairly and constructively with cultural diversity.

☐ 17.01 (Written expression) -- The LC demonstrates an ability to write clear, to the point, papers/reports with an economy of words.

☐ 17.02 (Written expression) -- The LC demonstrates the effective use of standard English and syntax in written communication.

☐ 19.01 (Legal & regulatory applications) -- The LC understands affirmative action laws and their application in schools.

☐ 19.02 (Legal & regulatory applications) -- The LC understands the fair employment practices laws and their application in schools.

☐ 19.04 (Legal & regulatory applications) -- The LC understands tenure.

☐ 19.16 (Legal & regulatory applications) -- The LC demonstrates knowledge of job-related and systematic personnel selection methods.

☐ 19.17 (Legal & regulatory applications) -- The LC demonstrates knowledge of systematic and documented employee discipline techniques.

☐ 19.18 (Legal & regulatory applications) -- The LC understands the personnel remediation process for certificated staff.

☐ 20.02 (Policy & political influences) -- The LC understands the roles in School Personnel Management.

☐ 20.03 (Policy & political influences) __ The LC understands the importance of close working relationships with agencies to meet the wellness needs of all staff.

☐ 20.04 (Policy & political influences) -- The LC demonstrates an ability to develop and implement effective employee recruitment and selection policy and procedure.

- ☐ 20.05 (Policy & political influences) -- The LC understands the process of negotiations.

- ☐ 20.06 (Policy & political influences) -- The LC demonstrates abilities to deal effectively with the administration of a collective bargaining contract.

- ☐ 20.08 (Policy & political influences) -- The LC demonstrates an ability to effectively handle an employee grievance.

This course contributes to the following Course Objectives for Leadership Candidates ("LC"):

- ☐ 01.04 (Leadership) -- The LC will demonstrate by stating and defending clear purposes of leadership built upon a well-reasoned educational philosophy and belief system which includes current research on effective schools, instruction, practice, and with an ultimate cause that will be of benefit to others.

- 01.06 (Leadership) -- The LC demonstrates an ability and a desire to learn, read, participate, and listen.

- 01.12 (Leadership) -- The LC will demonstrate an ability to make "hard decisions" based on facts/data regardless of the personal/personnel ramifications.

- 02.01 (Information collection) -- The LC will understand how to analyze problems from the standpoint of audiences affected.

- 02.02 (Information collection) -- The LC will demonstrate information collection in analyzing problems that includes checking for an reviewing appropriate policy, regulations, laws, precedents or practice.

- 02.06 (Information collection) -- The LC understands the use of technology (management information systems) as a tool for managing, analyzing, accessing and communicating information.

- ☐ 08.01 (Instructional program) -- The LC demonstrates the possession of a vision of an effective school and has a plan for implementation.

- ☐ 08.02 (Instructional program) -- The LC demonstrates an ability to lead and persuade a staff to "own" and share their vision.

- ☐ 08.14 (Instructional program) -- The LC demonstrates an ability to confront and effectively deal with marginal performance.

- ☐ 14.06 (Motivating others) -- The LC understands how to assess, maintain, and improve school climate.

- ☐ 14.09 (Motivating others) -- The LC demonstates an ability and willingness to take risks on matters of importance to a school staff and students.

- ☐ 14.10 (Motivating others) -- The LC demonstrates a variety of ways to appreciate others.

- ☐ 15.01 (Sensitivity) -- The LC demonstrates the NASSP sensitivity skill.

- ☐ 15.02 (Sensitivity) -- The LC demonstrates non-verbal support.

- ☐ 15.03 (Sensitivity) -- The LC demonstrates conflict resolution skills.

- ☐ 18.02 (Philosophical & cultural values) -- The LC demonstrates a desire and willingness to be a student advocate.

- ☐ 19.05 (Legal & regulatory applications) -- The LC understands the constitutional rights of employers, employees, and students.

APPENDIX H

MAYNARD'S SYLLABUS

[redacted]

SYLLABUS/COURSE OUTLINE

School Finance

Fall 1993, [redacted] Room 2

28-29 August, 25-26 September, & 30-31 October 1993

[redacted]

[S514-Syl.001]930723

Office hours: [redacted] campus Tuesday 10:00-11:00; Friday 10:00- Noon; Saturday after class, Sunday after class; and others by arrangement. Students may call me at any of the below numbers, but (please) not later than 9:00 PM at home.

Phones:

Direct (office)	[redacted]	[try first, if no answer then call]
Department	[redacted]	[leave a detailed message with the secretary and a phone number & time for me to return the call.]
FAX	[redacted]	
Home	[redacted]	
Bookstore	[redacted]	[To order books from [redacted] bookstore call the 800-#s. Books will be shipped ASAP when charged to a credit card; if paid by check, shipped upon receipt of check. If shipped out of state, no sales tax. S/H fee added. Sent UPS.]
or	[redacted]	

Brief description of course & prerequisites: Basic school finance theory and practice. Historical development, current trends, future expectations, involvement of various governmental agencies, and major problems and constraints of local, state, and federal financial support. Special attention is given to building-level financial planning and budget formulation. Prerequisite: ED AD 505, Equivalent course, or verifiable field experience. (1992-93 Graduate Catalog).

Required text: Burrup, Brimley, & Garfield, Financing Education in a Climate of Change (5th ed.), Allyn and Bacon (1993). This text is available from the bookstore; it is a new edition. Other materials, including State, Local and Federal Financing for Illinois Public Schools (most recent edition) will be provided by the instructor.

Voluntary reimbursement for copy services: $15; make check payable to "[redacted] Foundation -- Educ Admin."

Knowledge base:

[redacted] ED AD Department "Course Outcomes" and matrix (Spring 1992)

It is essential that school leaders have an understanding of the principles and practices of taxation, budgeting, and school funding to enable them to become advocates of educational equity and sound managers of public funds.

State, Local and Federal Financing for Illinois Public Schools [most recent edition], Illinois State Board of Education.

Course focus, goals, & objectives: This course is responsible for the following course objectives for Leadership Candidates ("LC"):

- 13.01 (Resource allocation) -- The LC understands sources and generation of revenue for local education agencies (LEAs).
- 13.02 (Resource allocation) -- The LC understands where local districts spend available funds.
- 13.03 (Resource allocation) -- The LC will understand the various types of budgeting practices in schools, including but not limited to, zero-based, program budgeting, and site-based budgeting.
- 13.04 (Resource allocation) -- The LC will understand the role of the building administrator and the administrative team in budget development.
- 13.05 (Resource allocation) -- The LC demonstrates an ability to develop a building level program budget involving appropriate staff and community members.
- 13.06 (Resource allocation) -- The LC will be familiar with funding mechanisms designed to promote the concepts of equity and equality.
- 13.08 (Resource allocation) -- The LC understands the funding mechanisms for school finance in Illinois and Iowa.
- 13.09 (Resource allocation) -- The LC understands how to set up and monitor a building level budget.
- 13.11 (Resource allocation) -- The LC understands how to develop and administer a preventative maintenance plan.
- 17.01 (Written expression) -- The LC demonstrates an ability to write clear, to the point, papers/reports with an economy of words.
- 17.02 (Written expression) -- The LC demonstrates the effective use of standard English and syntax in written communication.
- 19.19 (Legal & regulatory applications) -- The LC will be familiar with recent court decisions pertaining to state funding for education.
- 20.10 (Policy & political influences) -- The LC will develop an understanding of the costs of not educating students and that education is an investment in human capital.

This course contributes to the following course objectives for Leadership Candidates ("LC"):

- 01.06 (Leadership) -- The LC will demonstrate an ability and a desire to learn, read, participate and listen.
- 08.01 (Instruction program) -- The LC demonstrates the possession of a vision of an effective school and has a plan for implementation.
- 08.02 (Instructional program) -- The LC demonstrates an ability to lead and persuade a staff to "own" and share their vision.

"Failiar" (for familiar), schools (for school's), "persennel" (for personnel), "realalisticly" (for realistically), and "modles" (for models).

A proofreading tip: Read the paper aloud at a slow pace. Carefully read it one word at a time. You will also be able to catch awkward sentences, words missing, and misspelled words. If using a computer, use spell check.

School administrators write letters, memos to faculty, news releases, reports to various persons & agencies. There is no excuse for sloppy-copy work distributed as a final-copy product.

4. Submitting a paper for this class which was not written for this class by the author. Recycling is great for aluminum cans and plastic, but, please, not for research papers.

5. A paper that either does not address the required topic (for example, writing a paper for School Finance on "Characteristics of an Effective Instructional Leader") or a paper that is dominated by the student's opinions, unsupported by research.

Written work (study guide, self-assessment, exam(s), and any report(s) will be evaluated using the following criteria: (a) your ability to use appropriate content from class lectures, discussions, demonstrations, and research (print, audio, video, field); (b) your analysis and application; (c) your ability to write in a clear, concise manner; (d) appropriate use of standard English. For multiple-choice and true-false questions on exams, if you wish to justify your answer, you may write your comments on the exam to justify or explain the rationale why you selected a particular answer or why you rejected the alternatives.

Evaluation system: The following essential areas will be considered when determining final grades. In the event a group project is graded, each group member will receive the same grade/points.

Class participation	25 points
Unit exams	100
Budget process	25
Text Study Guide	50
Research paper	100
Final exam	100

Note 1: While the Cost of Education and School District Revenue/Expense reports are not graded, failure to do them will reduce your total points by 25.

Note 2: Class participation points are determined at the sole judgment of the instructor.

A	=	90	- 100%	A+ = 100; A = 95; A- = 90
B	=	80	- 89%	B+ = 89; B = 85; B- = 80
C	=	70	- 79%	C+ = 79; C = 75; C- = 70
D	=	60	- 69%	D+ = 69; D = 65; D- = 60
F	=	0	- 59%	

- ☐ 13.10 (Resource allocation) -- The LC understands how to adjust human and financial resources to meet changing needs.

- ☐ 14.05 (Motivating others) -- The LC demonstrates an ability to work fairly and constructively with cultural diversity.

Requirements & projects:

1. Participate in class discussions and activities.

2. Successfully demonstrate knowledge of the reading materials, class discussions, and activities on exams and reports.

3. Projects:

   A. Cost of education. See attached.

   B. School district revenue/expense summary. See attached.

   C. School district budget process. See attached.

   D. Research paper. See the text Study Guide for suggestions, possibilities. Each student will develop a 5-10 page research paper on a school finance topic to be pre-approved by the instructor. If you want, please call me before the first class session or between sessions to discuss possible topics; the numbers are above. Each student will develop a one-page abstract of the project and sufficient copies of the abstract to be shared with the class in a brief presentation of the results. As a department requirement, the APA style format for reference citations must be used with research papers.

NOTE: Some major errors for graduate-level papers are listed below. These are mentioned here so students will be especially "on guard" not to submit a paper with these types of errors.

1. Lack of agreement (subject-verb &/or pronoun-antecedent). For example:

   Subject-verb disagreement: Each teacher [singular] are [plural] expected to know school finance.

   Pronoun-antecedent disagreement: A teacher [singular] knows what to do in their [plural pronoun] classroom.

2. Unsupported statements which should be supported. When writing a research-supported paper, your own personal opinions should be limited to commentary, not presentation of "facts." For example:

   "Inadequate school funding is the most pressing problem facing American education." Who says? Such a statement needs to have a reference citation, using the APA style.

3. Obviously poor spelling or typos which should have been caught by careful proofreading. For example (all from the same paper):

Statement regarding class attendance (weekend classes): Regular and consistent class attendance is important. When you must be absent, please discuss if making up the work missed is possible. One Saturday is equal to three weeks of evening classes; one Sunday, two weeks. It's difficult to impossible to make up missed work, particularly group work and activities.

[redacted] ED AD Department Policy: Incomplete grades:

> Incomplete (I) is given under extreme extenuating circumstances. Although students are expected to complete the course requirements before the end of the term, in some instances it is recognized that students may not be able to do so because of factors beyond their control. In such instances, and upon written petition to the instructor, a temporary grade of "INCOMPLETE" may be given to permit the student more time to complete the course requirements. A student must satisfy the course requirements during the next semester (excluding summer sessions) or (s)he will be awarded a grade based upon work completed.

Administration job search assistance: Frequently the [redacted] ED AD Department receives vacancy notices for administrative positions. If/when you seek an administrative position please notify us. A 3x5 card with your name, address, & phone and position(s) sought as well as any geographical limitations or salary requirements will be helpful to us. You are also encouraged to register with the [redacted] Career Planning & Placement Office (phone [redacted]) which regularly publishes vacancy announcements for teaching and administrative positions. As an administrator, you are also encouraged to contact the placement office when you have teaching or administrative vacancies. For your convenience, on-campus interviews will be arranged for you by the Placement Office staff with candidates meeting your requirements.

For [redacted] students taking courses @ Iowa & elsewhere: For your [redacted] ED AD Dept file to be complete, please send a photocopy of your Iowa or other university grade reports to the [redacted] ED AD Dept. For graduation an official transcript will be needed, but in the interim a photocopy of the grade reports will be sufficient. It will also be appreciated if you write the course name, number of semester hours, and date of the course. Mail to: Records Secretary; ED AD Dept; 99 [redacted]

References:

Publication Manual of the American Psychological Association, (most recent edition); this is commonly called "The APA style manual." Available at the [redacted] Bookstore in paperback ($19.25).

Arnold, R; Hickrod, G.A.; & Polite, M. (April 1989). Special education costs and the impact on Illinois school district financial operations. MacArthur/Spencer Series Number 10. Normal, IL: Center for the Study of Educational Finance, Department of Educational Administration and Foundations, College of Education, Illinois State University.

Cubberley, E. (1905). School funds and their apportionment. New York: Teachers College, Columbia University.

Franklin, D.; Hickrod, G.A.; Wortham, M.; Ward, J.; Chaudhari, R.; Lenz, R.; Hubbard, B.; & Pruyne, G. (May 1987). The constitutionality of the

K-12 funding system in Illinois. MacArthur/Spencer Series Number 3. Normal, IL: Center for the Study of Educational Fiance, Illinois State University.

Hall, Robert F. & Smith-Dickson, Bonnie. (1990). Financing Illinois schools in the 1990s: Reaching a consensus. Macomb, IL: Illinois Institute for Rural Affairs, Western Illinois University.

Hall, Robert F. & Pierson, Max. (1991). School Finance in Illinois. Macomb, IL. Illinois Institute for Rural Affairs, Western Illinois University.

Hall, Robert F. & Pierson, Max. (1991). School Finance Reform in Kentucky, West Virginia and Texas. Macomb, IL: Illinois Institute for Rural Affairs, Western Illinois University.

Hickrod, G. & Ward, J. (March 1987). Two essays on the political and normative aspects of American school finance: An historical perspective. MacArthur/Spencer Series Number 1. Normal, IL: Center for the Study of Educational Finance, Illinois State University.

Hickrod, G.A.; Chaudhari, R.; Hubbard, B.; Polite, M.; O'Connell, P.; Pruyne, G.; & Mogill, A.T. (December 1987). Documenting a disaster: Equity and adequacy in Illinois school finance, 1973 through 1988. MacArthur/Spencer Series Number 4. Normal, IL: Center for the Study of Educational Finance, Department of Educational Administration and Foundations, College of Education, Illinois State University.

Hickrod, G.A.; Franklin, D.; Hubbard, B.; Hines, E.; Polite, M.; & Pruyne, G. Guilty governments: The problem of inadequate educational funding in Illinois and other states. MacArthur/Spencer Series Number 8. Normal, IL: Center for the Study of Educational Finance, Department of Educational Administration and Foundations, College of Education, Illinois State University.

Hickrod, G.A.; Liu, C.C.; Arnold, R.; Chaudhari, R.; Frank, L.; Franklin, D.; Polite, M.; Pruyne, G.; & Ward, J. (July 1989). The biggest bang for the buck: An initial report on technical economic efficiency in Illinois K-12 schools with a comment on Rose v. the council. MacArthur/Spencer Series Number 11. Normal, IL: Center for the Study of Educational Finance, Illinois State University.

Illinois State Board of Education. Illinois public schools financial statistics [most current edition]. Springfield, IL: Department of School Finance.

Illinois State Board of Education. Illinois teacher salary study [most current edition]. Springfield, IL: Office of Management and Policy Planning.

Illinois State Board of Education. State, local, and federal financing for Illinois public schools [most current edition]. Springfield, IL: Department of School Finance.

McMahon, W. (August 1988). Geographical cost of living differences: An update. MacArthur/Spencer Series Number 7. Normal, IL: Illinois State University.

Ward, J. (October 1987). The concept of adequacy in Illinois school finance. MacArthur/Spencer Series Number 5. Normal, IL: Center for the Study of Educational Finance, Illinois State University.

Additional worthwhile books on goal setting and management:

The Deming Management Method, Mary Walton (1986). Perigee Books published by The Putnam Publishing Group (200 Madison Avenue; NY, NY 10016).

Creating Learning Organizations: The Deming Management Method Applied to Instruction, Peter Loehr (most recent version).

The Goal: A Process of On-Going Improvement, Rev. ed., Eliyahu M. Goldratt & Jeff Cox (1986). North River Press, Inc. (Box 309; Croton-on-Hudson, NY 10520; phone 914/941-7175)

The Seven Habits of Highly Effective People: Restoring the Character Ethic, Stephen R. Covey (1989). A Fireside book published by Simon & Schuster (Simon & Schuster Building; Rockefeller Center; 1230 Avenue of the Americas; NY, NY 10020). Call 1-800-255-0777 to order directly from Dr. Covey.

Principle-Centered Leadership, Stephen Covey. A Summit book published by Simon & Schuster (Simon & Schuster Building; Rockefeller Center; 1230 Avenue of the Americas; NY, NY 10020). Call 1-800-255-0777 to order directly from Dr. Covey.

Leadership is an Art, Max DePree. A Dell Trade Paperback (1989).

Entry: The Hiring, Start-up, and Supervision of Administrators, Barry Jentz, et al. (1982). McGraw-Hill Book Company. Available in the WIU Macomb campus library: LB/2831/.62/.E57/1982. This is an excellent book for administrators beginning any new position to design an entry plan for success. (PL: If one does not plan to succeed, one has planned to fail.)

Note: Many of the in-class and out-of-class activities for this course deal with current practices in actual schools. In this regard students will have opportunities to learn about existing administrative practices from out-of-class activities and use such information during class for various purposes (as contained in the syllabus). If you are not currently associated with a school system, "adopt" one: Find one you are interested in and find an administrator & grade configuration which interests you. (You might select a district where you would like to work.) This is also a pre-internship experience.

Course Outline/Syllabus

		Chapter
28-29 Aug	Introduction: Cost of Education	2
	Politics & Economics of Education	1
	Equity vs. Equality	3
	Taxes	4
	Local Control	5
	Unit exam (Chapters 1-5)	
25-26 Sep	School Budgets	13
	Role of the States	6
	Role of the Federal Government	7
	Role of the Courts	9
	State Funding/Power Equalizing	10
	Illinois/Iowa State Funding Plans	
	Unit exam (Chapters 6, 7, 9, 10, & 13)	
30-31 Oct	Simulation - Reports	
	Final exam (comprehensive)	

Due dates:	**Cost of Education**	**28 August**
	Revenue & Expenditures	**28 August**
	Budget Project	**25 September**
	Research Paper	**25 September**

Note: Syllabus subject to change with notice.

APPENDIX I

MAYNARD'S STUDY GUIDE

NOTE: For your convenience, throughout this journal/study guide I have listed the page number and paragraph number of focus points. Some of these are merely statements from me. Others are questions for you to answer. Others are items asking for your reflection. What does reflection mean? I use the phrase to mean when you react to an idea with your own experience to come to something different, or a deeper, more personal understanding of the ideas.

I sincerely hope you will not approach this as "busy-work," although I envision that you will be occupied (that's another word for busy, I guess) in the reading, reacting, and reflecting.

Although some space has been provided here -- and I've tried to guesstimate about how much space might be needed "on average" -- if you need more space, feel free to add more pages if you need more space to write.

Text Study Guide

Financing Education in a Climate of Change, 5th Ed. (1993)

by Percy Burrup; Vern Brimley, Jr.; & Rulon Garfield

Allyn and Bacon, Inc, Publishers

Note: Much of the material in Financing Education in a Climate of Change (5th Ed.) is at the recall and comprehension levels of learning. Thus, it is dominated with reading, studying, and remembering. The ease of this information entering your long-term memory will be enhanced by periodically reviewing your notes here. As a further aid, alternate your review by going front to back, then back to front. This is called "chaining" by at least one learning theorist and reversing the chain effortlessly improves recall. I suggest reviewing at least every other week.

1: The Economics of Education

1-1. In simple terms, what is the study of economics? (p 2, para 1)

1-2. PL: The authors pose two questions that repeat through the text: "Is education to be considered an expensive luxury that has reached such proportions that it threatens the foundation of the nation's economic structure? Or is it, as most educators declare, an investment in human capital that stimulates rather than retards economic growth?" (p 2, para 4) Certainly, for schools to receive the amount of funding needed "to achieve excellence" it would require significantly more money which might threaten the local, state, and national economic structure. At the same time, however, where the schools "to achieve excellence" then the graduates would be able to stimulate great economic growth locally, in the state, and throughout the nation. If the schools continue not "to achieve excellence," is not the nation's economic structure even more threatened? Think of these throughout the course.

1-3. "Goods or services allocated to one segment of the economy are, of course, being denied to another. The economist must determine the proper mix of such distribution that will bring maximum satisfaction to the various segments of society.." (pp 2-3) PL: Herein lies the problem. It costs $3,500/year to educate a person and $30,000 to incarcerate one. Jesse Jackson used to ask: Do you want your children at Penn State or the State Pen? You'll find in this text relationships between the two.

1-4. "A county that strives to produce educational services is constantly increasing the range of economic productivity and affluence for itself. Countries that make only a minor effort in education usually produce only the material goods necessary for subsistence. The educational system thus becomes a very important result, as well as a determinant, of the social and economic progress of a nation." (p 4, para 4) PL: This is also a Deming concept of quality: When an organization becomes a learning organization and improves its quality (of production, service) it will increase its range of economic

productivity.

Are American schools striving to constantly improve or making only a minor effort, or perhaps more realistically, are American schools getting better, or getting worse? Respond to this from your own perceptions.

1-5. "It [Education] is an industry where objective data are readily available to determine its financial input but where no research or empirical study has yet found a satisfactory way to measure, or even approximate, its total output." (p. 5, top) What, therefore, problems does this create?

1-6. What percent of the gross national product (GNP) goes toward all educational institutions? And how constant has this been? (p 5, top)

1-7. Explain what the authors mean: "Thus, education is literally a consumer's good as well as a producer's good." (p 5, para 4)

1-8. Why are schools <u>not</u> parasites? (p 6, para 2)

1-9. According to Kentucky Governor Wallace Wilkerson, what fueled economic growth in the past? And what will fuel it in the future? (p 6, para 3-5)

1-10. One prominent finance writer asserts "Quality of education is intimately related to its financing." (p 7, para 2, Charles S. Benson) Serious question: If schools had twice as much money do you really think there would be much quality improvement? Why? (Support your answer with some logic, facts.)

1-11. The authors state: "Right or wrong, public institutions usually move more slowly to reduce the criticisms or implement the recommendations for improvement that their patrons make. Unfortunately, this fact has too often resulted in a high degree of resistance or practical indifference to change and innovation in public education." (p 8, top) Explain why the authors say this.

1-12. Much of the text will focus on the issue of equity, much moreso than equality. Equality (perhaps meaning equal input, =$/student/year) is not desired by finance theorists. Equity is desired. What is meant by equity?

1-13. PL: Public education finance involves a number of public policy statements that govern (determine) the direction ("right" and "wrong") of public support for education. Many such public policy statements will be made throughout the book, and often repeated. One such public policy statement is:

> "... [W]e do not believe that wealthier districts should be constrained from contributing what they believe to be an appropriate level of resources to educate their children." (p 8, para 4, Policy Committee of the Council for Economic Development, 1991)

On the one hand, isn't it only fair that parents/residents are able to support their school district's schools to the [great] extent they desire? Yet, on the other, this produces some public schools that provide youth far, far more than other districts. Not only is this obviously not equal, it also may not be equitable and in the public's best interests. Reflect on this dilemma. You will find it a common thread in the text.

1-14. The Governor of Washington State, Booth Gardner's comments to increase state support of schools (p 9, para 3) make more sense when you are familiar with Seattle School District v. State of Washington (1978), page 225. Why?

1-15. How are state funds -- from that big pot of money from income taxes, sales taxes, gas taxes, tobacco & alcohol taxes, lottery income -- divided among the various state agencies (K-12 schools, higher ed, welfare, prisons, police, and the myriad of state agencies asking for money? How are priorities (allocations) established? How does education fare in the division and why? (pp 9-10)

1-16. The authors state: "The reluctance of educators to communicate with the politicians in law-making bodies and tell them their problems has added to the allocation puzzle." (p 10, para 3) PL: Very, very true. Each superintendent should be in regular communications with area representatives (state and federal) about needs and concerns.

APPENDIX J

MAYNARD'S STUDY GUIDE EVALUATION

STUDY GUIDE EVALUATION FOR 522 TEXTBOOK [S522-TEXT.003]930406

Using a bubble sheet to record your responses, please react to the following statements by indicating that you:

1 = Strongly agree
2 = Agree
3 = Undecided
4 = Disagree
5 = Strongly disagree

Do not write your name on this page or the bubble sheet. If you would like to make additional comments, please use the back of this page.

Your comments/reactions will be carefully considered as I prepare to teach this class again. Thank you.

1. The study guide was helpful to me.

2. The time required by the study guide was worth it.

3. The questions or comments covered the significant aspects of the book.

4. The study guide is an effective way to cover the book, yet save class time for more activities and group work.

5. I learned more by using the study guide than I would have learned without it.

6. It is fair that final exam questions can come from the study guide items.

7. I recommend that the study guide be used the next time this class is taught.

8. I recommend that similar study guides be used in other courses.

9. The textbook: Looking back now, the textbook was a good book for this course.

10. The textbook: I recommend this book be used the next time this course is taught.

11. The textbook: This is a worthwhile book for me to keep for future professional reference.

STUDY GUIDE 522 Spring 93

EDAD 522 ITEM ANALYSIS PAGE 1

	RESPONSE	1	2	3	4	5	NR	MEAN- 1.09
1	TOTAL	20	2	0	0	0	0	STD DEV- .29
	PERCENT	90.91	9.09	.00	.00	.00		
	RESPONSE	1	2	3	4	5	NR	MEAN- 1.55
2	TOTAL	13	7	1	1	0	0	STD DEV- .80
	PERCENT	59.09	31.82	4.55	4.55	.00		
	RESPONSE	1	2	3	4	5	NR	MEAN- 1.27
3	TOTAL	16	6	0	0	0	0	STD DEV- .46
	PERCENT	72.73	27.27	.00	.00	.00		
	RESPONSE	1	2	3	4	5	NR	MEAN- 1.32
4	TOTAL	17	3	2	0	0	0	STD DEV- .65
	PERCENT	77.27	13.64	9.09	.00	.00		
	RESPONSE	1	2	3	4	5	NR	MEAN- 1.27
5	TOTAL	16	6	0	0	0	0	STD DEV- .46
	PERCENT	72.73	27.27	.00	.00	.00		
	RESPONSE	1	2	3	4	5	NR	MEAN- 1.23
6	TOTAL	18	3	1	0	0	0	STD DEV- .53
	PERCENT	81.82	13.64	4.55	.00	.00		
	RESPONSE	1	2	3	4	5	NR	MEAN- 1.14
7	TOTAL	19	3	0	0	0	0	STD DEV- .35
	PERCENT	86.36	13.64	.00	.00	.00		
	RESPONSE	1	2	3	4	5	NR	MEAN- 1.32
8	TOTAL	18	1	3	0	0	0	STD DEV- .72
	PERCENT	81.82	4.55	13.64	.00	.00		
	RESPONSE	1	2	3	4	5	NR	MEAN- 1.64
9	TOTAL	9	12	1	0	0	0	STD DEV- .58
	PERCENT	40.91	54.55	4.55	.00	.00		
	RESPONSE	1	2	3	4	5	NR	MEAN- 1.77
10	TOTAL	9	10	2	1	0	0	STD DEV- .81
	PERCENT	40.91	45.45	9.09	4.55	.00		
	RESPONSE	1	2	3	4	5	NR	MEAN- 1.77
11	TOTAL	7	13	2	0	0	0	STD DEV- .61
	PERCENT	31.82	59.09	9.09	.00	.00		

OVERALL MEAN- 1.40

NUMBER OF RESPONDENTS = 22

APPENDIX K

ROB'S DACUM COMPETENCIES

PROCESS IMPROVEMENT

185-113

DACUM COMPETENCIES

Awareness of Tools	(5.4)
Seven Basic tools	
Seven management tools	
QFD (Quality Function Deployment)	
TEI, JIT, VAM	
Productivity Improvement	(4.2)
Measurement	
Improve Process Design through Experiments	
Reducing Process Complexity	(5.4)
Feedback Systems	(4.5)
Monitoring Feedback Loops	
Process Prevention Systems	(5.2)
Designing Systems	
Work Processes	
Process control to prevent defects	
Poke-a-yoke	
PDCA	
Standardization of Process	(5.2)
Procedures	
S.O.P.	
Current Best Approaches	

APPENDIX L

ROB'S SYLLABUS

QUALITY AS AN ORGANIZATIONAL STRATEGY
185-110

INSTRUCTOR: [redacted] 01-18-93

PHONE: [redacted]

OFFICE HOURS: Before Class and by Appointment

COURSE SYLLABUS

CLASS HOURS: Wednesday, 6:00 to 9:00 PM
CLASS ROOM: Bordini Center

GENERAL COURSE DESCRIPTION:

This course provides an overview of the history and evolution of thought in total quality management. Trends in this field and management's role in planning for quality will be presented. Processes and concepts that do not yield data will also be discussed.

TEXTBOOKS: Quality is Free, Philip Crosby, Mentor
The Deming Management Method, Mary Walton

EVALUATION DATA:

• Attendance - This course provides a wealth of pertinent data on the Quality Gurus and Practitioners and their theories, as well as the current trends in TQM. Therefore, it will be important to attend each class. This becomes especially critical whenconsidering the scheduling of a variety of videos on current topics. If you must miss a class, please notify me in advance. I can then arrange for you to receive necessary materials andmake-up assignments. I will also try, wherever possible, toschedule a private viewing any video you may have missed. This can be difficult, however, so take this into consideration.

• Article Reports (3) - I will assign one to you, the other two you will select from articles you receive from me, or from articles you may choose to find in quality periodicals. In the Article Report, I will be looking for you to:

- O outline the key concepts or ideas
- O tell why the major concepts are important or significant
- O describe your opinions, thoughts and feelings regarding the key concepts - Do you agree or disagree, and why?
- O discuss any implications for you or you organization

• Book Review - Quality Is Free or Deming Management Method. For the case study portions of either of these books, you may choose to do a book review. In these sections, you will find examples of the major concepts of each expert. By examining the cases, you should extract the key concepts and explain how they are interrelated as the quality process was implemented. You can point out successes and failures, and discuss the implications of these as you reflect on your own organization.

• Assessment - Determined by participation, completion of assignments, and demonstrated level of awareness of the concepts of quality.

GRADING SYSTEM: Ask me! 

QUALITY AS AN ORGANIZATIONAL STRATEGY
185-110

Course Timeline

Dates	Topic
01-27-93	♦ Overview of Course
02-03-93	♦ Why Quality?
02-10-93	♦ The History of Quality
02-17-93	
02-24-93	♦ Quality Gurus
03-03-93	♦ W. Edwards Deming
03-10-93	♦ Joseph Juran
03-17-93	♦ Philip Crosby
03-24-93	♦ Ishikawa, Imai, Taguchi
04-07-93	♦ Second Wave
04-21-93	♦ Conway, Scholtes, Joiner
04-28-93	♦ Baker, Scherkenbach, Feigenbaum
05-05-93	♦ Trends
05-12-93	♦ Malcolm Baldridge Award
05-19-93	♦ Deming Prize
05-26-93	♦ Hoshin Planning
06-02-93	
	♦ APPROACHES TO QUALITY: Guru Approach Integrated Approach TQM Element Approach Company Model Approach Prize Criteria Approach Consultant Approach
	♦ Where have we come?
	♦ Where are we going?

APPENDIX M

ROB'S COURSE DATA FILE

COURSE DATA FILE

Prepared by:	Date Approved:	Date Revised:
	October 12, 1990	September 1993

Course Number	Course Title:
185-113	Process Improvement

Division:
Business

Len

Cre

	d Lecture Hours:	Total Lab Hours:
3		0

Cou
impı
redu

depth the tools of process
revention systems, innovation,
uring consistency will be covered.

Prer
Non

Req
Quality Improvement Process Specialist

Textbook–Title, Author, and Edition:
The Key to Japan's Competitive Success, Imai, Masaaki, Kaizen

Tools, Uniforms, Supplies Required:
None

Of the wording of any of the competencies need changing let me know. This is your copy.
Shirley

Process Improvement Course No. 185-113

Course Competency List

1. Define and explain key terms used in process improvement.
2. Identify the elements of a process.
3. Explain and use the PDCA cycle.
4. Describe the concept and practice of Kaizen.
5. Use simple process improvement tools.
6. Describe the basic concepts of Process Improvement.
7. Use flow charting tools and apply to a current work process.
8. Identify examples of complexity within selected work processes.
9. Use the process of Daily Management.
10. Integrate the Hoshin Planning Process with Daily Management.
11. Review several process improvement models from the private and government sectors in order to utilize or customize a process for internal use.
12. Use TQM to achieve Kaizen.
13. Describe the influence of organizational culture on continuous improvement efforts.

Outline:	Performance Objectives:
1. Processes and Standard Operating Procedures • **Housekeeping** • **What is a Process?** • **Standard Operating Procedures** • **Variability**	**1. The student will be able to:** a. Define "process" as used in process improvement. b. Explain "variability" and provide examples of variability in the work environment. c. Write a standard operating procedure (S.O.P.).
2. Elements of a Process and PDCA • **Old Paradigm vs. New Paradigm** • **Voice of the Customer** • **Voice of the Process** • **PDCA** • **Funnel Experiment** • **SOP - Operationalized**	**2. The student will be able to:** a. List and explain the rules of the funnel experiment. b. Define and describe PDCA. c. Explain the difference between the voice of the process and the voice of the customer and provide instances of each in the workplace. d. List the elements of any process.
3. Kaizen • **Kaizen** **Maintenance** **Improvement** **Innovation** • **Process Orientation vs. Results Orientation** • **Tools** **H5W** **5 Why's** • **Process Improvement Project Selection**	**3. The student will be able to:** a. Define Kaizen. b. Describe the difference between "P" criteria and "R" criteria, and explain the implications of an orientation to each. c. Use H5W and 5 Why's as data collection tools for problem-solving or process improvement.

Outline:	Performance Objectives:
4. Basic Process Improvement Concepts • **Problem Free Engineering** • **The Big Three (3 Basic Workplace Problems)** • **Four Basic Principles of Improvement** • **Seven Kinds of Workplace Waste**	**4. The student will be able to:** a. Explain the concept of Problem-Free Engineering and describe its applicability to the work environment. b. List the three basic workplace problems and provide examples of each. c. List and describe the four basic principles of improvement and explain which of the four is most effective. d. Identify and provide examples to illustrate the seven kinds of workplace waste.
5. Mapping Processes • **Detailed Flow Chart** • **Top Down Flow Charts** • **Transformation Matrix** • **Responsibility Maps** • **Work Flow Diagrams** • **Value Added/Cost Added Flow Charts** • **Tree Diagrams** • **Variance Analysis** • **Cycle Time Analysis**	**5. The student will be able to:** a. List four types of flow charts and describe/explain why and when you would use each. b. Use two or more of the flow diagrams to outline a process for improvement. c. Locate and describe variances within that work process by means of variance analysis tools. d. Use cycle time reduction tools to eliminate, combine or rearrange process steps in order to decrease overall cycle time.

Outline:	Performance Objectives:
6. Complexity • **Perfect Processes** • **Real World Processes** • **Finding Complexity** • **The Real Work Model** • **Work Sampling**	**6. The student will be able to:** a. Define complexity as it relates to process steps. b. Find complexity in a work process, as well as apply the concepts of real work to an organizational work process. c. Describe the concept of work sampling, and plan for the application of work sampling to an actual work process.
7. Daily Management **Hoshin Planning** • **Daily Management - Defined** • **Daily Management - Components** **Customer Obsession** **Training** **Teamwork** **Standardization** **Measurement** • **Application** • **Hoshin Planning - Overview/Review** • **Process Management**	**7. The student will be able to:** a. Define Daily Management and describe its components. b. Describe the integration between Daily Management and the Hoshin Planning process. c. Apply Daily Management concepts and tools to a simulated work process.

Outline:	Performance Objectives:
8. Process Improvement Models • **Joiner 7 Step Method** • **Xerox QIP** • **RAC's Continuous Improvement Strategy** • **Miller Consulting's Improvement Plan** • **Excellence in Government** **10 steps** **7 objectives**	**8. The student will be able to:** a. Present the key aspects of at least one identified continuous improvement process in a formal presentation. b. Select significant process improvement steps, as presented, and describe how they might impact his/her own process improvement project. c. Discuss the similarities and differences among the processes and compare the steps of each with the PDCA cycle.
9. Kaizen and TQC: Making It Work • **Kaizen and TQC** **People First** **Quality vs. Profit** **Manufacturing Orientation vs. Customer Orientation** **Training** **PDCA** **Standardization** • **Kaizen in Practice** • **The Three Pillars of Kaizen** **Management** **Group** **Individual**	**9. The student will be able to:** a. Describe the interaction of the PDCA and SDCA cycles. b. Define and describe the three pillars of Kaizen. c. Explain why standardization is so important to a successful Kaizen process. d. Explain why suggestion systems, successful in Japan, have not been very popular or effective in the United States.

APPENDIX N

JOE'S MINUTE PAPERS

STAT 101 Mini-Questionnaire
September 9, 1992

1. What has been the most important topic covered in lecture thus far?

2. What has been the most difficult topic covered in lecture thus far?

3. Does the instructor use the chalk board effectively? Any problems?

4. What can be done to improve the lecture?

STAT 101 Survey 1 October 5, 1992

1. The material covered is presented in an organized way.

1	2	3	4	5
strongly disagree				strongly agree

2. The instructor makes the material interesting.

1	2	3	4	5
strongly disagree				strongly agree

3. The instructor is knowledgeable with the material.

1	2	3	4	5
strongly disagree				strongly agree

4. The instructor speaks clearly.

1	2	3	4	5
strongly disagree				strongly agree

5. The instructor cares about the class.

1	2	3	4	5
strongly disagree				strongly agree

6. The pace of the class is ...

1	2	3	4	5
way too fast	too fast	about right	too slow	way too slow

7. Which of the following are problems with the chalkboard presentation: (circle all that apply)

1	2	3	4	5
too small	too light	too low	erased too soon	no problem

8. Which of the following are problems with the overhead presentation: (circle all that apply)

1	2	3	4	5
too small	too light	too low	switched too fast	no problem

9. The instructor gets the class involved ...

1	2	3	4	5
way too much	too much	about right	too little	way too little

10. Rate your overall satisfaction with the lecture.

1	2	3	4	5
very unsatisfied				very satisfied

11. The text: *Introduction to the Practice of Statistics* is easy to understand.

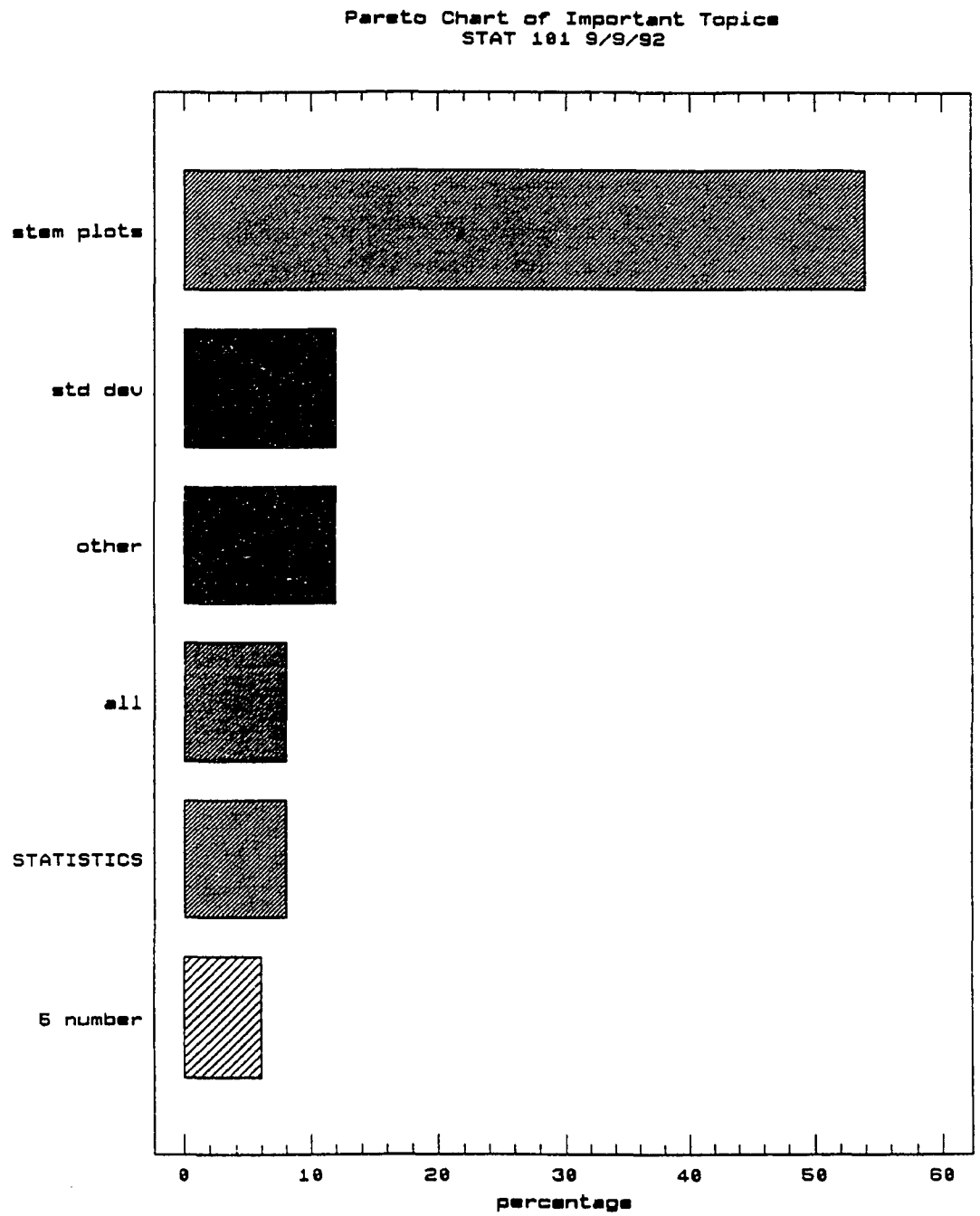
1	2	3	4	5
strongly disagree				strongly agree

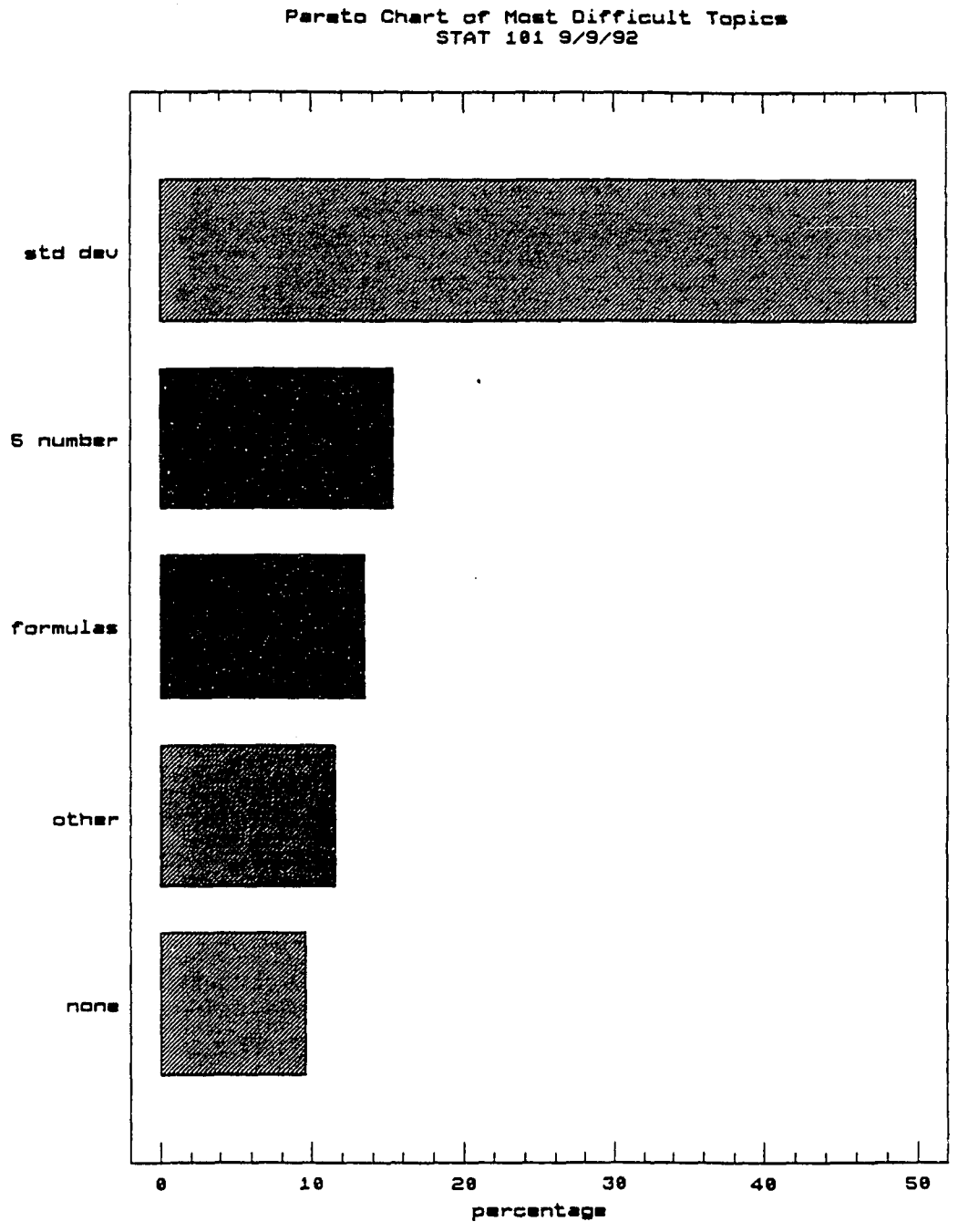
12. Number of lectures that you have missed (out of 18) ____

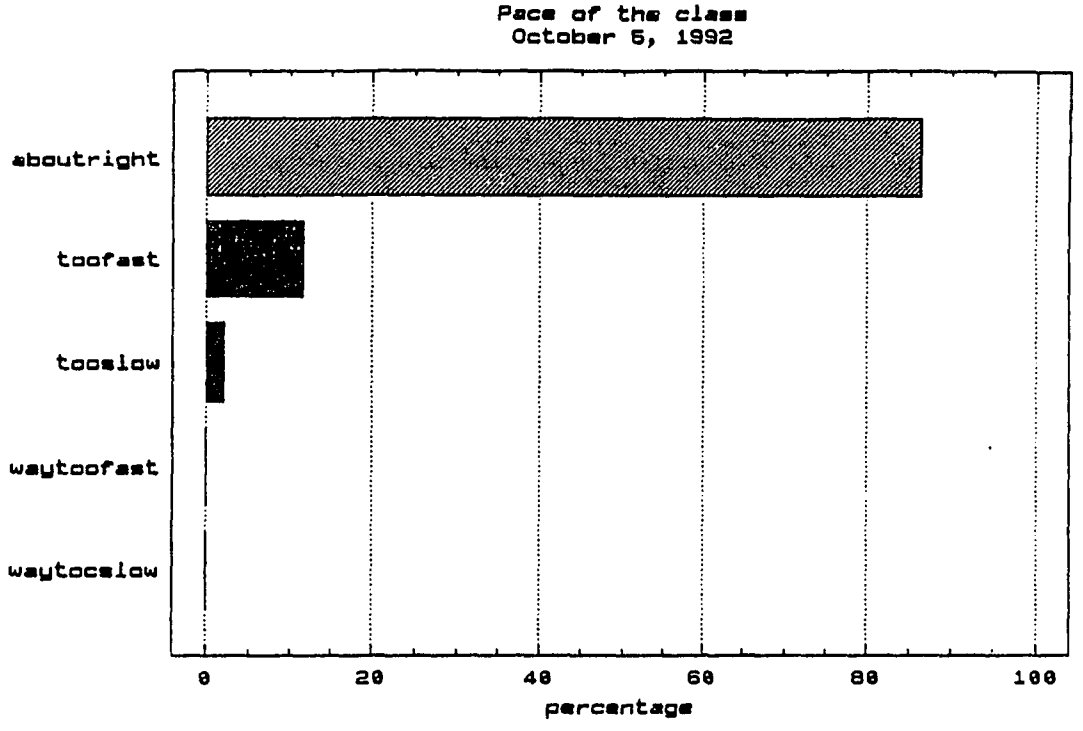
13. The time (hours) including homework you spend on this course per week outside of class and lab. ____

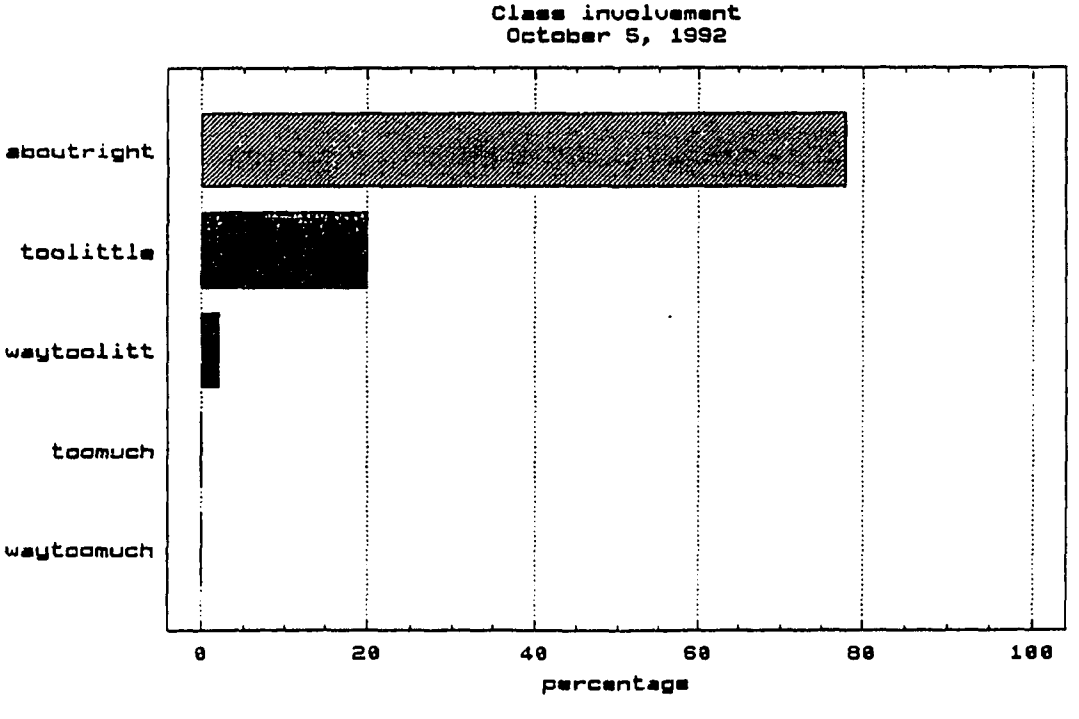
APPENDIX O

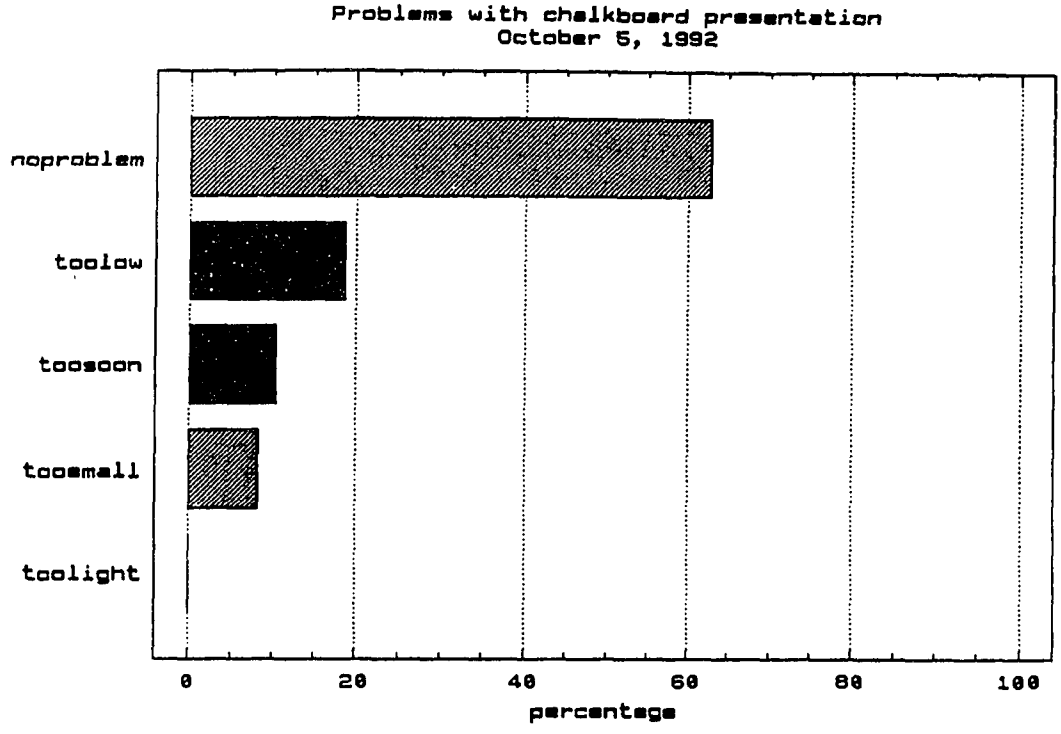
JOE'S PARETO CHARTS

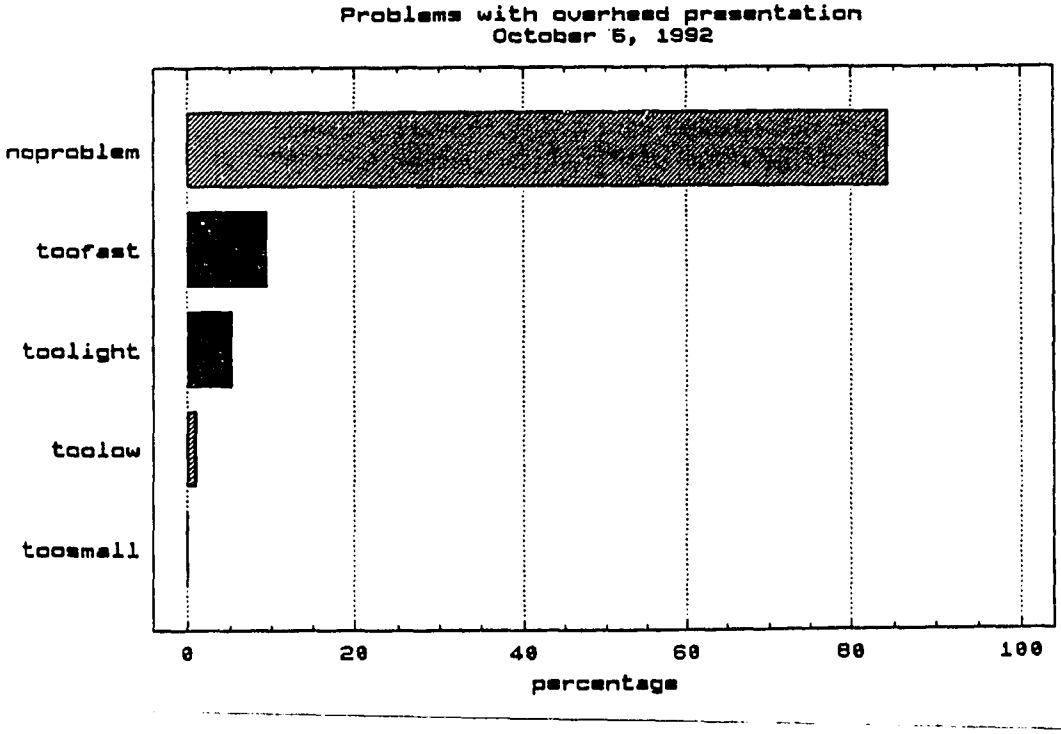



Pareto Chart of Most Difficult Topics
STAT 101 9/9/92
std dev
6 number
formulas
other
none
0
10
20
30
40
50
percentage


Pace of the class
October 5, 1992
aboutright
toofast
tooslow
waytoofast
waytooslow
0
20
40
60
80
100
percentage


Class involvement
October 5, 1992
aboutright
toolittle
waytoolitt
toomuch
waytoomuch
0
20
40
60
80
100
percentage


Problems with chalkboard presentation
October 5, 1992
noproblem
toolow
toosoon
toosmall
toolight
0
20
40
60
80
100
percentage


Problems with overhead presentation
October 5, 1992
noproblem
toofast
toolight
toolow
toosmall
0
20
40
60
80
100
percentage

APPENDIX P

MAYNARD'S FORCE FIELD ANALYSIS

Name/alias:_____

The Research Paper: Understanding Facilitating & Hindering Experiences

[redacted], Director of Writing, Department of English
Department of Educational Administration
[redacted]

[Writ-Res.#2]930928

Purpose: The purposes of this are to: (1) Diagnose facilitating & hindering experiences in individual student's research paper experiences and (2) Gather data to better understand groups of students to make systemic changes in curriculum and instruction areas.

The vertical lines in the topics below represent the status quo: Where you are now. This is based on the concept of a "force field." Where our individual attitudes are on certain topics at the present time is a result of the positive experiences and the negative experiences we have each had in the past. For example, each of us has an attitude toward chocolate that determines how much chocolate we eat. A possible "force field" for an individual's attitude of chocolate might be something like:

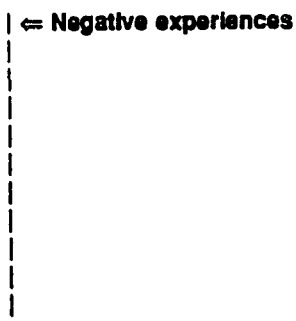
Positive experiences ⇒	⇐ Negative experiences
+ I genuinely like the taste of chocolate, especially with coffee after lunch.	- Cavities from chocolate when young.
+ I'll never pass up "Death by Chocolate" as a desert when I eat a good meal out.	- Being criticized for eating candy when young.
	- Calories now; I'm watching my weight.
	- Messy fingers when it's hot.
	- Poor quality of chocolate in hot months.

DIRECTIONS: For the following items, please reflect on your own past experiences with each phase of the research paper process and write the positive experiences you have had and the negative experiences. We recognize that these steps may be difficult to so neatly separate in the actual writing process. However, for the purposes here, please think of these as separate steps.

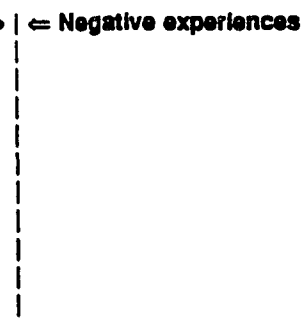
1. Deciding on a research topic/subject.

Positive experiences ⇒	⇐ Negative experiences

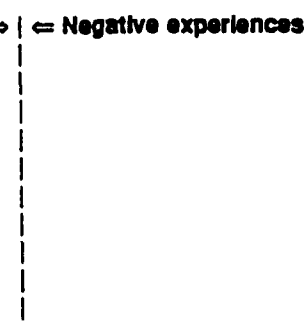
2. Physically gathering resources.



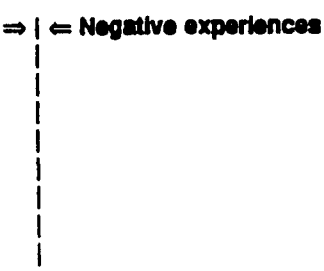
3. Intellectually using the resources (reading, studying).



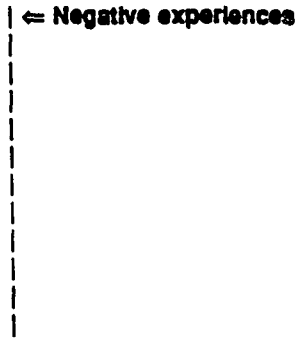
4. Organizing the ideas.



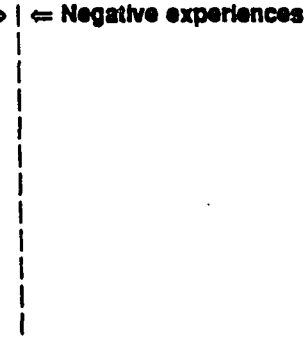
5. The physical & mental processes of writing the "paper" (general composition).



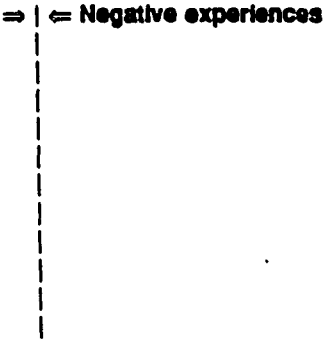
6. The physical & mental process of revising the "paper" (general composition).



7. Mechanics of edited written English (grammar, spelling, etc.).



8. Conventions of a research paper (footnotes, bibliography, etc.).



9. Personally budgeting the time to do the above tasks.

Positive experiences ⇒ | ⇐ **Negative experiences**

10. When I think of research I (select one):

____ think of reporting others' findings (summarizing existing information).

____ think of answering a question.

____ think of supporting a particular position (as, for example, attorneys are either "for" or "against" a position).

11. When I think of past readers of my research papers, I predominately picture (select one):

____ Someone critiquing the form of the paper (footnotes, bibliography form, organization of the paper).

____ Someone who is interested in learning from me.

____ An expert who is evaluating my mastery of material (s)he already knows.

12. What grade(s) did you receive on your most recent research paper? A B C D F

13. What is your University year? ____ Frosh; ____ Soph; ___ Jr; ___ Sr;___ Grad-1; ___ Grad-2

14. How many years since your last writing class? (write # yrs) _____

15. What is your age? _____ Gender? ____ Female; ____ Male

16. What is your academic major or career goal? _____

APPENDIX Q

ROB'S TEMPORARY ASSESSMENT POLICY

Grading Policy:

The architects of this program, in an endeavor to synthesize the concepts of Competency Based Learning and Deming's writing on Performance Appraisal and the Use of Final Inspection to gain quality, have very carefully examined the traditional evaluation practices and have, with collaborative support from the Academic Deans and the Vice President of Academic Affairs, deviated from those practices in the following ways:

We have chosen not to sort students according to A, B, C, D, F, IP, etc...

We have chosen to hold ourselves true to "competency based", and therefore will seek to build ongoing assessment based on performance of required activities.

Students who meet all course requirements will receive the grade of A, since the WBVTAE requires a letter grade for all associate degree courses.

Students who do not meet course requirements will receive an extension (EXT), with a specified period of time to complete negotiated requirements. This requires a meeting or telephone conference with the instructor. The option exists for further extension, based on student circumstances. Students who meet the requirements after extension will then receive the grade of A. If, after extension(s) the student cannot or will not meet the requirements of the course, the student will receive an F.

This system of assessment shares the responsibility for success between instructors and learners, and tests the concept of "Competency Based Learning". It takes the instructor out of the role of "student sorter", and places him/her in the role of facilitator of learning for all students. Learners are asked to accept responsibility for the learning process. Allowances are made for life circumstances (the system) which may impact the learning process during a semester. Learners are not penalized for circumstances beyond the control of the classroom which may impact their ability to meet requirements within the specified time.

SCIENTIFIC METHOD 2
185-122

Competency	Information	Comprehension	Application	Analysis	Synthesis	Evaluation
VOICE OF THE PROCESS						
Rules of Variation						
Histogram						
Variation/Probability						
Central Tendency/Dispersion (Mean, Median, Mode, Range)						
Tolerance and Specification						
Standard Deviation						
Terms/Symbols						
Cause and Effect						
Pareto Chart						
Scatter Diagram						
Run Chart						
Checksheet						
Variable Data						
Average/Range Control Charts						
Median/Range Control Charts						
Individual/Range Control Charts						
Attribute Data						
p charts						
np charts						
c charts						
Capability						
Design of Experiments						
VOICE OF THE CUSTOMER						
Gathering/Using Customer Input						
Surveys						
Interviews						
Focus Groups						
Suggestion Systems						
Point of Service Evaluation						